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BOTANICAL AND GEOGRAPHICAL EXPLORATION IN THE ASSAM HIMALAYA

F. KINGDON WARD

Meeting of the Society, 30 October 1939

GEOGRAPHICALLY Assam is the valley of the Brahmaputra between its exit from the hills and its right-angled turn to the south, in Bengal: a triangular or funnel-shaped plain lying on its side, with its mouth gaping open to the west, corked at its apex by a knotted mass of mountains. A trident of rivers enter the apex and unite to form the Brahmaputra. North and south the Assam valley is bounded by converging ranges of mountains: those to the south are the Naga Hills, separating Assam from Burma; those to the north are the Assam Himalaya, forming the ramparts of Tibet.

In the first decade of the present century the Assam Himalaya were still an almost mythical region; geographers did not know what became of the Great Himalayan range east of Bhutan, or even whether it continued as a well-knit range. It was unlikely that it ended abruptly in Bhutan, but precise knowledge was lacking. Looking northwards from Kohima in the Naga Hills in winter, one can see across the plain of Assam and the Brahmaputra a distant line of snow peaks, over 21,000 feet high. These are the Assam Himalaya, seen obliquely, so that they quickly fade out of the picture; they do not stretch squarely across the horizon.

Opposite the Bay of Bengal the Himalaya reach their southernmost limit, and from a general north-west–south-east alignment gradually turn north-east, and trend clear away from the plains. If we try to pass along the foot of the mountains, we shall find it a more exacting task going east than it is going west. The reason is that owing to the funnel shape of the valley the monsoon rushes up it like a tidal bore in a narrowing estuary, and the rainfall increases rapidly eastwards, till at the foot of the Abor and Mishmi Hills beyond Sadiya it exceeds 200 inches. The deep screen of lesser ranges between the edge of the plain and the main crest-line, drained by the Subansiri river and its tributaries, also adds to the difficulties of eastern Himalayan exploration; as a climax, these foothills are inhabited by quite unreliable tribes. Hence

east of the Bhutan frontier there is only one road from the plains of India over the Himalaya on to the Tibetan plateau, in a distance of 250 miles, although between the point where the Subansiri breaks through and the Dihang gorge there are numerous passes over the main range, locally used for a few months in the year. The main range in the last 150 miles of its north-eastward extension is surprisingly low, until suddenly elevated in the towering spire of Namcha Barwa. The presence of these numerous flat low gaps in the range, of which the Doshong La is a good example, testify to the work of glaciers, and prove conclusively that the eastern Himalaya has been a very wet area since before the Pleistocene ice age.[1]

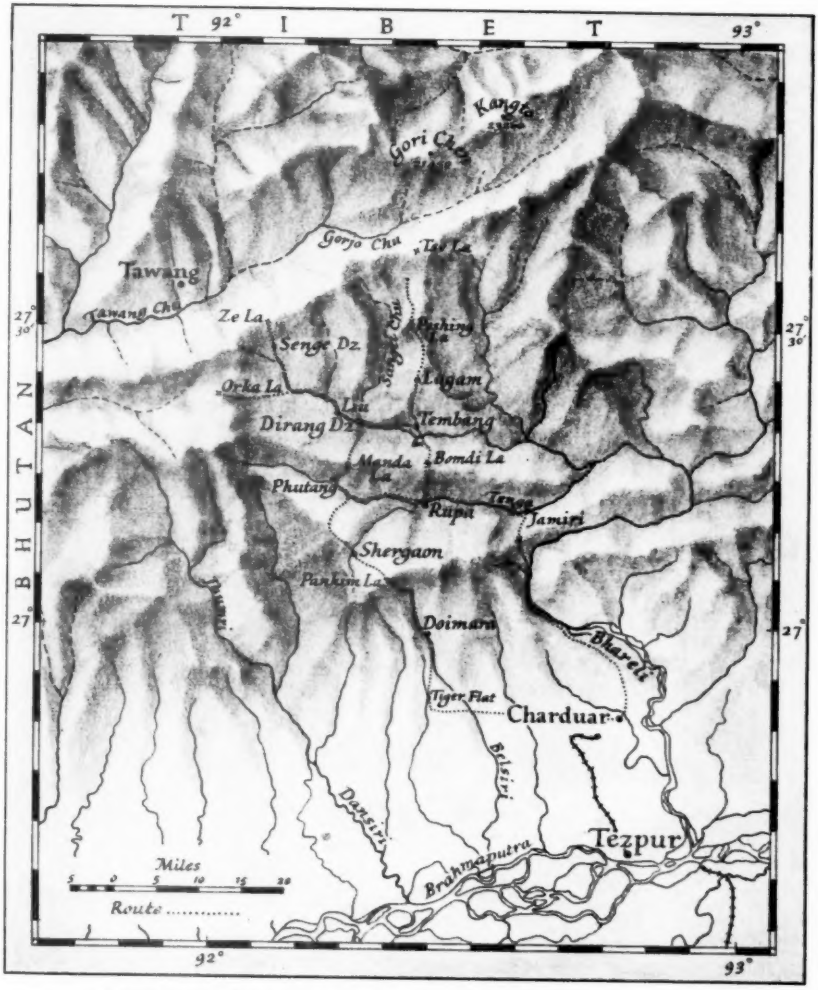
It was not till the twentieth century that explorers became aware of the easy route into Tibet referred to above. It had been assumed, not without reason, that the dual obstacles of savage tribes and fanatical monks would bar approach from this direction: it was known that the mysterious monastery of Tawang exercised its authority for some distance to the east of Bhutan. Actually, a strip of country about 40 miles wide between the Bhutan frontier and the Bhareli river, where the rainfall is comparatively low, is inhabited, not by savage tribes, but by a people allied to the Bhutanese called Mönba, and their offshoots, Sherdukpen and others; while the hostility of the monks of Tawang appears to have been exaggerated. This strip of country, lying to the south of the main Himalayan chain and reaching almost to the edge of the Assam plain, is called Mönyul and has long been under the influence of the Tibetan church. Nevertheless it was only gradually, through the explorations and influence of a number of political officers (notably Colonel F. M. Bailey, Captain Nevill, Dr. Norman Bor, I.F.S., and Captain G. S. Lightfoot) that this route became established and in a sense opened up to the botanical explorer.

While geographically Assam is a well-defined monsoon region, consisting of the plains valley of the Brahmaputra, politically as a province of the Indian Empire it is less natural and more unwieldy, including mountains as well as plains. A frontier there had to be, and it could not be on the edge of the plain; that might conceivably imply an unfriendly power surrounding the province on three sides. Therefore it had to be in the mountains. In India we have always gone far back into the mountains in search of a frontier, until we came to the highest range of all, the actual crest-line and watershed of which was selected as the frontier. But watersheds, especially in the eastern Himalaya, are often cut through by rivers, thereby losing some of their status. The passes over a mountain range also present difficulties if both sides wish to control them.

In the *Journal* for November 1936 I described my journey across southern Tibet, which I reached *via* Mönyul; but of Mönyul itself I said little, as I passed rapidly through the country. It is of that region, on the southern slopes of the eastern Himalaya, between the plains and the Tibet plateau, that I am going to speak here.

In April 1938 I started from Tezpur, an arid dusty town on the Brahmaputra, shorn now of its shoddy splendour as an Ahom capital. A rickety lorry

[1] Several of these passes have been explored by Mr. F. Ludlow and Captain George Sherriff.



Sketch-map showing the route followed by Mr. Kingdon Ward

Carved monastery window, Dirang Dzong

Rhododendron aganniphum

Carved monastery window, Dirang Dzong

Rhododendron aganniphum

carried me and my belongings along the 21 miles of dirt road to Charduar, an outpost at the foot of the hills. The scenery is flat and uninteresting: paddy fields and tea gardens. Charduar, with its satellite station Lokra, is the headquarters of the Balipara Frontier Tract, one of three hill regions which surround the head of the Assam valley and through which passes the *de facto* frontier.

The Balipara Frontier Tract differs from the other two frontier tracts in the large proportion of unadministered to administered territory, which is about 5 : 1. But if the whole of Mönyul is considered part of the tract, only about a tenth of the area, lying on the plain, is administered. Between administered and unadministered territory a frontier known as the "inner line" is drawn. The hill tribes may cross the inner line on to the plains for purposes of trade, or to work; but no plainsman, whatever his creed, colour, or race, may cross the inner line and enter the hills without the written permission of the political officer. This is to avoid incidents with the tribes, who, as already remarked, are unreliable.

Charduar consists of the political officer's bungalow and a small village. There is a detachment of Assam Rifles at Lokra, 2 miles away; the whole is surrounded by paddy fields, tea gardens, and jungle. By the end of April the weather is very hot on the plain; the Himalaya are generally cloud-capped, but occasionally the snows show up, nearly 100 miles away, the peak of Gori Chen, 21,450 feet, conspicuous through the gap made by the Bhareli river.

The Assam Himalaya comprise a series of parallel ranges of ascending magnitude, all trending north-east–south-west. They may be divided into outer, middle, and inner ranges, with their corresponding longitudinal valleys. North of Charduar the outer range is comparatively high, in some places reaching 9000–10,000 feet, with the result that the valleys immediately behind the ridge are much drier than one would expect them to be so close to the plains. The outer ridge here, sometimes called the Akha ridge, for a length of 30 or 40 miles is high enough to break the force of the monsoon and act as a rain-screen; and whereas the rainfall on the south side is 90–120 inches, on the north side it is barely half that. It is through this "dry gap" that the Mönyul–Tibet road referred to passes. Farther east, and westwards towards Bhutan and Sikkim, where rivers have cut their way back through the middle and inner ranges, and even through the main Himalayan range itself, the outer ranges are lower, and the rainfall becomes heavier rather than lighter as one penetrates deeper into the mountains. In fact there is no lessening of the rainfall until the main crest-line itself is crossed, and at the extreme eastern end of the Himalayan chain even this forms a very imperfect rain-screen, the rainfall north and south of the main range being much the same.

I left Charduar on April 27 for the five days' march over the outer range to the first village in Mönyul. There is a dry-weather motor road westwards along the foot of the hills for 24 miles; but the Belsiri river is not bridged, and from this point it is necessary to go on foot. The baggage is carried by coolies.

Turning north from a camping-ground on the edge of the plain, called Tiger Flat, the path joins a valley which enters the hills. By the end of the third day's march from Charduar we had ascended 2000 feet, following the rocky bed of a

torrent; we were then in the evergreen rain-forest which grew rapidly more temperate as we continued to climb. On the fourth night we camped a little below the Pankim La, the first Himalayan pass, about 9000 feet. All round us was a forest of magnificent trees, including oaks, maples, hollies, birch, magnolia, *Michelia*, and rhododendron, while a little higher along the ridges grew hemlock spruce. The big trees were thickly felted with moss, and from every limb sprang flowering shrubs, especially *Rhododendron Lindleyi*, now in fine bloom, as well as masses of ferns and orchids. The rainfall here exceeds 100 inches, and the air is always cool and moist. In three days we had passed from monsoon to moist evergreen temperate forest.

Crossing the pass next morning we came suddenly into forests of blue pine (*Pinus excelsa*) and deciduous oak, freshly clothed with young foliage; and descending through open glades, sprinkled with woodland flowers, reached cultivated fields and a village. We had descended barely 2500 feet from the pass, and were in a much drier country of wide elevated valleys and wooded rounded hills.

Shergaon, though not strictly a Mönba village (the inhabitants call themselves Sherchokpa), is under the influence of the Tibetan church. The natives speak a dialect of their own, and build curious three-storied houses, the ground floor of stone used as stables, the first floor of timber, where the family dwell, the second floor and roof of bamboo matting; the top floor is the storeroom and general junk cupboard: a loft rather than a room.

From Shergaon, using ponies as well as coolies, we crossed three more ranges of hills. The path, though generally steep and sometimes precipitous, was comparatively good. In these dry inner valleys, at 7000 feet I found the ugly little *Primula filipes* abundant on shady banks. For a century, since it was first discovered by Griffith in Bhutan, this plant has puzzled botanists; there is very scanty material of Griffith's collecting, and nobody seems to have met with it since his day. But gardeners would not say thank you for it. On the Manda La, crossed on the third day from Shergaon, I noticed a mixture of Sikkim and Bhutan plants, including such species as *Bryocarpum himalayicum* (in flower), *Primula Whitei* (almost over), and *Cathcartia villosa* (flowering in July), and Chinese plants like *Rhododendron euchaites* and *R. megeratum*, both in bloom. It is possible to say with fair accuracy now how far westwards in the Himalaya the Chinese flora penetrates; it is much more strongly represented east of the Bhutan frontier than west of it, although there is of course a certain uniformity in the alpine flora of the entire western China–Himalayan–Tibetan area, which I have named the Sino-Himalayan.

The Manda La is a long cross-ridge about 10,000 feet high. It is covered with forests of silver fir (*Abies Delavayi*) and tree rhododendron (*R. Falconeri*). From the north end of the ridge I had a glimpse of the snow-covered mountains of the Bhutan frontier to the west. A long steep descent brought us to a deep dry valley through which one of the headwater streams of the Bhareli flows eastwards. At the confluence of the torrent from the Manda La with this river stands the big village of Dirang Dzong, headquarters of the local administration of Mönyul. Here I made my base for six months' botanical work, occupying the travellers' rest-house, a barn-like stone-and-timber building with two non-communicating compartments. I was free to travel

westwards and northwards to the passes into Bhutan and Tibet, and eastwards to the edge of the jungle leading into tribal country.

In the course of the summer and autumn I made the following journeys: to the Poshing La *via* Tembang and Lagam, returning by the Sangti Chu (May 12–27); to the Orka La, on the Bhutan frontier (June 3–18); to Phutang *via* the Manda La, direct to Rupa (Dukpen), north over the Bomdi La, across the Dirang Dzong river to Tembang, Lagam, Poshing La, and back by Dirang Dzong as before (July 6–24); to Senge Dzong and the Tse La (August 14–30); to the Orka La as before (September 24–October 4); to Phutang, Rupa, and down the river to Jamiri, thence south to the Bhareli and Charduar (October 20–31).

The political status of Dirang Dzong is ambiguous. The surrounding country is ruled by two Tibetan *dzongpöns*, appointed from Tawang, who live in the "fort," a large white building perched on a hillock overlooking the village. They collect the taxes, listen to complaints, and maintain law and order without the help of a single soldier or policeman. In fact there is no visible force in Mönyul. Two abstract ideas, public opinion and custom, operate on the side of peaceful routine; and the church helps to restrain men from running amok. The Mönbas, who seem never to have struck a blow for themselves, are almost servile. They have definitely thrown in their lot with Tibet, and where Tibet cannot help them—as for instance against the Akha tribes to the east—they buy immunity. The Bhutanese ignore them; the Tibetans rule them; the Akhas fleece them; and the British have, or had up to quite recently, forgotten them. The *de facto* rulers of Mönyul are the Tibetan *dzongpöns*, but the Akha chiefs also pay periodical visits and collect the anti-aggression taxes for themselves, which the Mönbas pay as the price of immunity from tribal raids. The *dzongpöns* meanwhile hold aloof, feeling that so long as the Mönbas pay their Tibetan taxes, what they pay to the Akhas is none of their business. The Akha taxes are probably pre-Tibetan. After the Tibetan Church has had its share, what is left is the Mönba's own. He probably sees very little real money; but he appears to have enough to eat, lives in a substantial, if dark and comfortless, house, and enjoys life. Trade is carried on almost exclusively by the Bhutanese and Tibetans; the Mönba is a peasant or a herd. The Akhas do not appear to penetrate farther west than Dirang Dzong.

The principal crops are barley, which ripens in June, followed by maize, ripe by September, followed by a winter crop of buckwheat. Very poor crops of barley are raised, the attacks of "smut" being serious. But great pains are bestowed on the maize crop. A very little rice is grown at certain villages, as at Liu, and in the Sangti valley. Chilis are also extensively grown.

The cottage industries are weaving, paper-making, and wood-turning. There is a certain amount of building, carpentry, carving, leather work, and metal work, all rather crude but a great advance on anything the Akha tribes are capable of. The arts come from Tibet, and are in the hands of the priesthood. The only pastime is fishing, with rod, line, and noose. There are plenty of snow trout in the Dirang Chu.

My first journey was to the Poshing La (11,950 feet) to see the rhododendrons in bloom. Twelve miles east of Dirang, on the left bank of the river, is

Tembang, a fortified village perched on a precipitous spur. It is, or ought to be, an outpost, guarding the upper valley from Akha raids. The position looks impregnable, and the village is surrounded by a wall, approached only from two directions by flights of steps. But the Mönbas are too timid to hold the fort, and tribal chiefs stroll insolently through the village collecting tribute. From Tembang we turned north towards the snowy range, and climbed to the small wooden monastery of Lagam (9200 feet), on a spur. This is the last habitation until two high passes have been crossed to reach Mago. The forest round Lagam is beautiful, and here is the mixture of Chinese and Himalayan species to which reference has already been made. The rhododendrons include *R. Griffithianum*, *R. euchaites*, and the epiphytics, *R. Boothii*, *R. micromeres*, *R. Lindleyi*, and *R. bullatum*. There are also *Illicium*, *Michelia*, maples, oaks, laurels, and birch. The only common conifer is the weeping blue pine, *Pinus excelsa*, and this is dominant or comparatively rare according to local conditions. At this altitude the rainfall is, if not heavier, at least more persistent than lower down, with the result that there is a large epiphytic flora, including shrubs like *Eriobotrya* and *Pentapterygium* as well as numerous ferns and orchids. This forest, between 6000 and 9000 feet, may be called warm-temperate pine forest. *Lilium nepalense* var. *concolor* is found locally on bracken-clad slopes where the undergrowth is periodically fired to encourage pasture and keep down the forest, and pine is dominant but scattered. We spent the night at Lagam, and I noticed dusty but still gorgeous tragopan skins hung up in the monastery.

On May 16 we climbed the steep rocky path towards the Poshing La in pouring rain, and after ascending 1000 feet came in quick succession first into hemlock and then into silver fir forest: the first silver firs are met with at about 10,500 feet. We were now amongst tree rhododendrons of many species, and although at the lower levels some were already past their best, the total effect was magnificent; above 11,000 feet they were only just beginning to flower, and at 12,000 feet still in bud. The crimson scarlets of *R.R. Hookeri*, *barbatum*, and *arboreum*, the creams, and yellows of *R.R. Falconeri*, *sidereum*, and *grande*, the last three named with immense leaves, and the orange of *R. Keysii* inflamed the sombre forest of silver fir. We camped on a grassy alp where the ridge had been cleared of forest, with a deep pool of water on one side. The weather was very wet, but early the next morning, before the valleys warmed up, causing the cloud to rise, we enjoyed an extensive view. Eastwards we could see the mountains towards the Subansiri, southwards the plains were visible beyond the ridges we had crossed, and westwards the Ze La above Senge Dzong, and the Bhutan frontier.

After resting a day to botanize, we crossed the rocky Poshing La on the 18th. The gneiss cliffs of the pass are stark naked, but the dry stony bed of a torrent which formerly flowed from a glacier in the valley above was filled with interesting plants. Above 11,000 feet two tree rhododendrons, *R.R. Wightii* and a big-leafed species allied to *R. grande*, with magnificent heads of flowers in all shades of cerise and carmine, replaced the other species. *R. fulgens* (crimson) formed impenetrable thickets, but *R. Thomsonii* (blood red) and *R. campylocarpum* (sulphur) were not so common. The only undershrub species in flower was the pink *R. glaucum*. An unusual plant, mostly seen

Lilium Wallichianum, above Dirang Dzong

Meadows of Primula Dickieana at 13,000 feet

Dirang Dzong

Orka La: the last tree

clinging to some crag, was a pink-flowered form of *R. lanatum*. Normally this species has yellow flowers, but at the Poshing La, and in the next valley, at Mago, they were never anything but pink. When I visited the Orka La a fortnight later, I found *R. lanatum* even more abundant, but there the flowers were never anything but the typical yellow. The two varieties seem never to mix. The local distribution of rhododendron species in the eastern Himalaya is indeed puzzling. For example, at the Poshing La I collected about twenty-five species, but the common *R. campanulatum* was not one of them. In the next valley, at Mago, and at the Orka La, it is abundant. It seems to be missing also at the Ze La.

Enough has been said about rhododendrons to suggest that there are more species in the Assam Himalaya than in Sikkim and Bhutan together. In fact the number steadily increased as we went eastwards and the rainfall and humidity increased, reaching a maximum probably in the neighbourhood of the Tsangpo gorge. We camped at a clearing called Samjung (12,850 feet) in the valley north of the Poshing La, and a few miles south of the Tse La. It was very much colder here than on the ridge south of the pass, and scarcely a rhododendron was in bloom. So we recrossed the pass next day and returned to the other camp on the alp. The stream which flows past Samjung rises at the Tse La, and is the source of the Sangti Chu. Below Samjung it flows in a deep gorge, and for this reason one must cross the spur and descend by a ridge. Formerly a glacier from the Tse La flowed past Samjung and down the south face of the Poshing La, in the valley to the east. As the ice retreated however the stream found it easier to cut a valley for itself round the west side of the spur. It is because it was formerly a river bed that the south side of the Poshing La is so difficult.

We spent a few days at the alp, where it rained persistently. It was still early for alpine flowers, but the rare *Primula Wattii* (like a woolly grape hyacinth) was just coming into bloom, and on the gneiss cliffs grew a delightful primula with white or navy blue flowers, and wash-leathery leaves. Starting down on May 25 in a deluge, and taking the short cut to the Sangti river, we reached Dirang Dzong on the 27th. There are six or eight villages up the Sangti Chu, the two largest being Sating on the right, Pootung on the left bank. At a village called Kaso there is a cantilever bridge, and there is another just above the Dirang Chu confluence. The total number of houses in the valley is about a hundred, and the total population 400–500.

On June 3 we set out for the Orka La, a pass used by traders coming from eastern Bhutan. The main path goes straight up the ridge from Dirang Dzong, but it is very steep for the first 2000 feet. Instead, we went up the main valley to Liu, a village containing almost as many houses as Dirang. The houses are closely packed, but higher up the slope is a small and picturesque monastery where I was given accommodation.

Next day we ascended several thousand feet to a Drokpa village of six or eight bamboo huts, in an extensive artificial pasture in the midst of forest. There is no cultivation, for though the altitude is not much more than 8000 feet the local crops will not ripen at this height. In Tibet, crops are grown at very much higher altitudes; but there the climate is dry. The slopes have been extensively cleared to encourage grazing; but the chief result of cutting

and burning the forest is to prepare the ground for large invasive weeds rather than grass. True there are impenetrable thickets of *Arundinaria*; but this is not a grass fit for grazing by cattle. Elsewhere one sees colonies of fern and of an immense leafed Composite. No experiments or continuous observations as to the effects which follow the destruction of high-altitude vegetation seem to have been undertaken. An important problem is the investigation of the effect of deafforestation at 9000–12,000 feet in the eastern Himalaya, where the total number of grazing cattle, sheep, goats, and ponies is high. It would appear that in many places the forests are destroyed without any corresponding advantage resulting. Indeed positive harm may be done to the grazing it is intended to promote. Thus the ground sometimes becomes waterlogged owing to the absence of trees to take up the moisture: with the result that certain species of primula, notably *P. Dickieana* and *P. Kingii*, which cattle will not eat, take complete possession of the ground. The seres which follow the destruction of climax vegetation in the alpine region vary. Grass may be encouraged for a time, but this appears to be a very temporary and unstable phase.

From this Drokpa village we had a fine view of the main snowy range to the north. The Drokpa are a sturdier, better dressed, and better looking people than the Mönba peasants. In every Drokpa village one finds one or more summer resident monks from the monastery under whose wing the territory lies. They are permitted to marry.

Our third day's climb was a short one. Crossing a ridge, we joined the direct path to Dirang Dzong, and ascended through a forest of silver fir and rhododendron to a large shallow basin-shaped marsh, where we camped on a low mound. The marsh was crimson with myriads of plants of the tiny jewel-like *Primula Kingii*, almost touching one another. Interspersed with them, and few by comparison, were scattered plants of the even smaller *P. glabra*. Round the fringes of the marsh, irises were coming up, under the shadow of big rhododendron bushes, *R. fulgens*, *R. campanulatum*, and *R. Wightii*.

The fourth day's climb up the steep ridge to a pasture above the tree-line near the pass was longer. This was on a ridge at the head of the valley, altitude about 13,000 feet. Tufts of dwarf rhododendron, like large comfortable hassocks (the pink *R. anthopogon* and the purple *R. fragariflorum*), competed with pasture consisting largely of *Primula Dickieana*. Where the ground was marshy the primula formed almost solid sheets; but on drier ground the rhododendrons held their own. In some places the cutting and burning of the forest had encouraged scrub or dwarf rhododendron, and a sere consisting almost entirely of one species (*R. aganniphum*) had resulted. As the scrub, growing 6 or 8 feet high, was cut and burnt, large colonies of *Meconopsis grandis* had sprung up, though this poppy, so abundant just here, is actually a rare and extremely local Himalayan species.

One further example of the changes induced by upsetting the climax balance of vegetation may be given. The narrow paths through the fir forest followed by cattle are thickly bordered by two species of primula, the yellow-flowered *P. strumosa* and the violet *P. Gambleiana*. Both species are rare and scattered as a rule; but large concentrations occurred wherever the yak passed to and fro. Superficially alike, except in flower colour, these two species

growing cheek by jowl, rarely cross, or at least the hybrid offspring, if they come up, rarely survive. On the exposed slopes, which are always steep, even precipitous, few trees hold their own, and here there was a certain amount of pasture. This was partly due to the fact that the dominant alpines were not June-flowering primulas, but autumn-flowering gentians (*G. amoena*, *G. gilvostriata*, *G. Szechenyi*). In fact the spring growth is very scanty, and the cattle not unnaturally prefer the lush marshes which they are rapidly transforming into fields of solid primula. The occurrence in the eastern Himalaya of *Primula Clutterbuckii*, which H. M. Clutterbuck discovered in the Mishmi Hills, Assam frontier, when we were exploring there in 1928, came as a surprise. It was far more abundant here than it was in the Mishmi Hills, and a stouter, better looking plant altogether. I might also mention an Androsace, like *A. sarmentosa*.

I ascended to the Orka La one day. Its altitude is 13,617 feet, according to Ludlow and Sherriff. The view into Bhutan is restricted, and Sakden, the highest village, a few miles down the valley, is not visible. Just below the pass on this side is a glacier lake, and there is a second lake up a branch valley. These glacier lakes lie in deep basins and have no shore, hence no wading birds are seen on them; I saw a pair of Brahminy duck one day, but nothing else. There are several kinds of pheasants lower down in the rhododendron forest.

The weather during the first half of June was bad, with a continuous gale blowing sheets of rain across from Bhutan. Descending by the direct path to Dirang Dzong, I found *Rhododendron cinnabarinum* and *R. Keysii* in full bloom, and on the rocky slope between 8000 and 10,000 feet a large variety of shrubs. These included *R. euchaites*, and lower down, *R. polyandrum*, one of the latest to flower, *Buddleia Colevillii*, *Neillia thyrsiflora*, *Litsaea*, *Cinnamomum*, *Cotoneaster*, *Spiraea*, *Viburnum*, *Salix*, and several others. The only large tree was a species of juniper, with an occasional larch or hemlock spruce at the higher level. It is from the rootstock of this juniper that the wooden cups are turned on the village lathe.

On July 6 I crossed the Manda La to Phutang, with the Political Mission which was on its way back to Charduar from Tawang. As usual, it was very wet on the high range, but comparatively fine in the deep valleys on either side. The magnificent *Lilium giganteum* was in flower near the pass, and in the forest the epiphytic *Rhododendron camelliaeflorum*.

From Phutang I turned east down the Tenga river, another tributary of the Bhareli, to Rupa (Rupraigya), reached in two days. On the second day we entered a fine limestone gorge, and here I first saw the beautiful *Lilium Wallichianum* in bloom on the grassy hillsides. We passed through patches of climax forest in the gullies where no fire had ever reached, and I noticed such trees as *Albizzia*, *Cedrela*, *Carpinus viminea*, *Acer*, *Schima Wallichii*, *Ilex*, *Ficus*. Later we found almost pure stands of old *Rhododendron arboreum*, with an undergrowth of bracken and grass, but hardly any shrubs. From Rupa I turned north again, and reached a small Khoa village hidden away in the mountains. The Khoas are a tribe split off from the Akhas, for whom they work. On the following day we crossed the ridge, camping in the forest at about 9000 feet, opposite to, but considerably higher than, Tembang. On

the third day we only got as far as a village on the right bank of the Dirang river, and several hundred feet above it; and on the fourth day, crossing the river by cane suspension bridge, we climbed about 2000 feet to Tembang.

Collecting a fresh team of coolies, we followed our previous route *via* Lagam to the Poshing La. The rhododendrons, with few exceptions, were now over—it was the middle of July—but the alpine vegetation was at its best, and in a trip to the pass between two bouts of fever I found several interesting plants including *Cremanthodium*, *Meconopsis sinuata*, *Nomacharis nana*, and *Omphalogramma*—perhaps *O. Elwesiana*, a rare Sikkim plant. Strange to relate, while we were camped near the pass the weather suddenly turned fine, and we were favoured with magnificent views. On the way down we camped on a grassy alp called Dongri, at about 10,000 feet altitude, surrounded by a forest of silver fir, hemlock, and rhododendron, mixed with *Magnolia globosa*, whitebeam (*Pyrus*), *Sorbus*, and other deciduous trees.

At sunrise the next morning the sky was perfectly clear, and to my surprise I had a splendid view of snow peaks forming a continuous range behind the Poshing La. They towered above the tree-clad range in the foreground, bearing 17° at one end, 28° at the other, *i.e.* about north-north-east from Dongri. Between the farthest forested ridge and the snows yawned a wide chasm, from which cloud was beginning to rise. These peaks may stand on the main Himalayan range, east of Gori Chen, which is 35 miles distant. But they seemed to me to be not more than 20 miles off, and may stand on the ridge crossed by the Tse La, at the source of a river which flows from the north to join the Bhareli some miles east of Tembang. If that is so they have not been intersected, and in fact are quite unknown; which seems rather improbable.

Round Dongri grow large bushes of a handsome Berberis with holly-like leaves, and big yellow flowers named *B. dasyclada*. In the forest grow numbers of the geranium-leafed *Primula Normaniana*, with mop heads of purplish pink flowers. Like *P. Clutterbuckii* it was first discovered in the Mishmi Hills. On the way down to the Sangti Chu I found a colony of *Lilium nepalense*. Most of them were over, but a few late ones were still in bloom and very beautiful they looked. There were not more than a hundred plants scattered over an acre or two of steep hillside; I never saw this plant again. *L. Wallichianum* on the other hand was common everywhere in the dry Dirang valley, as well as round Rupa.

In the middle of August I left Dirang to visit the Ze La, a pass on the main road to Tawang and Tibet, between the Orka La and Poshing La. The road goes up the valley to Liu, then climbs steeply to a village called Nyukmadong, and to Senge Dzong on a spur. From Senge Dzong it is a straight ascent of 4000 feet to the Ze La. We camped nearly level with the pass on August 19, at an altitude of about 13,600 feet. The Ze La is almost always enveloped in cloud, and during the week we spent here it was extremely wet. Often when the neighbouring ranges are clear the Ze La is hidden by cloud.

Above the pass the gneiss cliffs are rather bare, but on the sheltered side, in crevices, I found two tiny primulas and the sky-blue *Meconopsis bella*, with many other plants.

Returning to Senge Dzong I stayed a few days, and here I found an unusual-looking shrub, with bright brick-red flowers in poker-shaped heads, probably

a species of *Phlomis*. On the sunny slope below the ridge, a bright yellow-flowered orchid blazoned the rocks, and there was also a curious species of *Codonopsis*. From Senge Dzong we returned to Nyukmadong, and thence back to Dirang. There is a path over the mountains from Nyukmadong to Mago, but a heavily laden man cannot use it. I decided to stay in Dirang Dzong till the weather, now at its worst, improved; it was September 23 before we started on a second trip to the Orka La. Throughout September and October several species of clematis were flowering profusely, but there was not much else in the valley, which was drying up fast. At the end of the month we had sharp frosts in the alpine region, and the monsoon in the inner valleys had slackened off. The gentians were amongst the few plants in flower at this season, and they made a wonderful show on the alpine turf slopes.

On October 20 we started south for the plains, camping the first night just over the Manda La in order to collect rhododendron seed; next day we descended to Phutang. Following the small road westwards, as in July, we reached Rupa two days later. *Cypripedium Fayerianum* was in full flower on the limestone cliffs, to which it seems to be confined; and on these sun-baked well-drained slopes were equally large colonies of *Bergenia ligulata*, a big leathery-leafed saxifrage. The most direct route to Charduar from Rupa is *via* the Piri La and the village of Doimara, inhabited only between December and March by the Sherdukpen tribes. But Doimara is three marches from Charduar, and as the rainy season was not yet over on the plains, the people would take me no farther than there. I was in a hurry to get back to join another expedition, and did not fancy being dumped in the jungle at Doimara with no certain means of moving my kit from there. So I gave up the idea of crossing the Piri La and chose the route *via* Jamiri and the Bhareli river.

The Tenga valley east of Rupa is filled with pine-oak forest, like the country to the west. For a whole day we marched across one grassy terrace after another. Then on the second day, within the space of a few miles, pine-oak forest gave place to thick evergreen jungle. We had crossed an invisible line, beyond which the rainfall suddenly increased.

Jamiri is an Akha village of half a dozen long bamboo huts. But though the people are tame they are not very helpful, and are inclined to make all sorts of excuses for not supplying coolies if they can help it. However after a day's delay and much arguing, transport was supplied and we crossed in two marches the low ridge which separated us from the main Bhareli river. We were now in dense subtropical evergreen rain-forest, of pure Indo-Malayan type. The pass is hardly more than 6000 feet, and apart from several handsome species of begonia on the rocks, there were few flowers. On the fourth day from Jamiri we crossed the "inner line" at Bhalakpung, and reached the motor road 24 miles from Charduar, where we arrived on November 1, after an absence of just over six months.

My botanical collections from the Assam Himalaya (Balipara Frontier Tract) amount to nearly a thousand species, including an unknown number of new species, also numerous plants of horticultural worth, of which seeds were obtained. Particularly interesting was the discovery of many Chinese species so far west on the Himalayan chain. It is clear that Assam and north Burma

form the connecting link between the more strictly Himalayan element as in Sikkim, and the purely Chinese element developed in Yunnan; so that such plants as *Magnolia globosa*, *Rhododendron euchaites*, *R. bullatum*, *R. megeratum*, *Primula Wattii*, *P. Dickieana*, *Clethra Delavayi*, and many others bridge the gap. The Chinese element increases steadily east of the Bhutan frontier, and by the time north Burma is reached forms a large proportion of the vegetation, in spite of a high degree of endemism. Indeed the degree of endemism between the eastern Irrawaddy basin and the Lohit is probably higher than in any other section of this country of equal area. It includes high mountains with very heavy precipitation, and a perpetually humid atmosphere; the mountains are under snow for from four to six or eight months.

In most parts of Mönyul the rock is schist or gneiss, the latter forming the bulk of the high Ze La range. But in the south-east, between Phutang and Jamiri, and particularly in the Tenga valley, a hard light grey mountain limestone, weathering almost chalk white, is exposed. Here the streams flow in deep gorges. The flora of this limestone belt is noticeably different from that of other parts; and yet few of the plants appear to be confined to limestone, though their association may be characteristic of it. Above 12,000 feet glacier action is manifest, as at the Orka La, Ze La, and Poshing La. The river pattern appears to be consequent upon the glaciation of the eastern Himalaya. At first sight it looks complicated, but that is because many of the streams flow in deep gorges, which are quite impassable, so that the routes have to cross the ranges. It is the roundabout routes which are complicated, not the river system.

The Ze La range itself, and the country beyond it, is unsurveyed, and so also is some of the country to the south-east. The chief difficulty for the surveyors has been the courses of the rivers, which cannot be followed by the eye even from the highest peaks so far attained. Many peaks on the Ze La range and on the lesser ranges to the south have been fixed; but where the draughtsmen have had to guess the courses of the rivers, they have generally guessed rong. The river pattern of Mönyul may be briefly explained as follows:

The Ze La range, which strikes north-east–south-west, forms the water-parting between the eastward and westward flowing rivers. This Ze La range is an offshoot of the main Himalayan chain.

The eastward-flowing rivers rise on the southern flanks of the Ze La range, and flow to the Bhareli, which takes an easterly course, and joins the Brahmaputra above Tezpur. The westward-flowing rivers rise on the northern flank of the Ze La range, and flow westwards or south-westwards to the Manas, which itself flows southwards through Bhutan to join the Brahmaputra opposite Goalpara.

The westward-flowing rivers, as soon as they reach the forest zone, plunge into impassable gorges. (In the alpine region they flow in comparatively wide open valleys.) This is where they are *crossing* the Ze La range, which blocks their way to the south. The eastward-flowing rivers, having to cross no such obstacle, continue to flow in open valleys, although there are short gorges in the limestone districts.

Formerly all these inner Himalayan valleys north of Phutang were occupied

at their heads by glaciers. As the glaciers retreated they left as a legacy to the rivers which had sprung from them their wide shallow furrows. Gradually these streams cut for themselves V-shaped channels in the wide U-shaped furrows which they had inherited. This they were able to do easily, being charged with glacier grit: moreover their beds were steep, and the intense melting of the ice in summer, combined with the monsoon rain, gave a powerful volume of water. The country was then more like a plateau than it is to-day, and early Palaeolithic man, if he dwelt here, would have had no difficulty in crossing from valley to valley. There could have been little forest.

DISCUSSION

Before the paper the PRESIDENT (Field-Marshal Sir PHILIP CHETWODE) said: Mr. Kingdon Ward, who is going to lecture to us this afternoon, needs no introduction. He is a well-known botanist and a Gold Medallist of the Society, and has given us many papers upon the Burmese and Chinese borders of Tibet. During his last journey he went a little farther west and is now going to tell us of six months' experience in the Assam Himalaya.

Mr. Kingdon Ward then read the paper printed above, and a discussion followed.

The PRESIDENT: I am not going to call upon many speakers because I feel sure nobody wishes to stay late owing to the black-out. Perhaps Colonel Bailey will say a few words?

Colonel F. M. BAILEY: Mr. Kingdon Ward referred to the danegeld which the people of Dirang Dzong had given. My experience of that part of Tibet is that the Tibetan is the easiest person in the world from whom to extract taxes. He complains a good deal, but he pays. If you visit a village and ask an inhabitant to whom he pays the taxes, he will reply: "Well, there is the big landlord; every year we have to send him a yak and a pony. Then there is the monastery. We have to send them so many loads of butter and so many musk-pods and other things for making incense. Then the white people come from over the border and we give them something too, usually salt. We have none ourselves, but we mix what we can get with sand and other things. Life is very difficult because of the terrible taxation under which we suffer."

I envy Mr. Kingdon Ward the weather which resulted in the wonderful photographs we have seen this afternoon. Many years ago I visited Dirang Dzong from the north, but was unable to take any photographs comparable to his. I experienced the most frightful rain during the whole period of my stay.

The PRESIDENT: I now ask you to thank the lecturer not only for his interesting lecture, but for what were some of the most fascinating photographs we have seen here, especially those of the plants: one could hardly believe the flowers were real.

PRIMITIVE TRIBES IN MADAGASCAR

OLIVE MURRAY CHAPMAN

Meeting of the Society, 8 April 1940

MY main object in journeying through Madagascar in spring and summer 1939 was to see and photograph as many of the Malagasy tribes as possible, and to observe their varied and often curious burial places and tombs, descriptions of some of which I had read in the books of the late James Sibree, for many years a missionary of the London Missionary Society in Madagascar. I planned in particular to visit the Tanala tribes, who live amongst the forested hills of the south-east, and to find if possible one of their hidden burial places, difficult of access and therefore rarely seen; and which had never, so far as I had heard, been photographed. I also wished to note especially the Antaimoro, around Manakara on the east coast, and the Antanosy, the Antandroy, Mahafaly, and Vezo Sakalava to the extreme south-east, south, and south-west of the island. In order to carry out these plans it was necessary to cover a considerable distance across country, for Madagascar is 1000 miles in length, 360 miles across at its widest point, and covers a combined area as large as France, Belgium, and Holland. A chain of mountains with an average height of from 4000 to 5000 feet stretches like a backbone down the centre of the island, sloping away in the south and west to wide plains; the eastern side of the range, covered in parts with dense forest and tropical vegetation, drops sharply towards the coast.

The problem of the origin of the Malagasy has not been entirely solved and is of great interest to anthropologists; for although marked traces of African and negroid blood are found in certain of the tribes, especially those of the south and west coasts, the main stock is obviously from the East. It is believed that the largest and most important tribe of the Malagasy, the civilized Hova who inhabit that part of the high plateau known as Imerina, surrounding Tananarive, came originally of Malayo-Polynesian stock, with which they are said to have numerous affinities. Tradition states that the Hova on their arrival, at some uncertain date, conquered an aboriginal tribe then in Imerina; these people, the Vazimba, were of African origin and were said to be dwarfs, similar to the pre-Bantus of Central Africa. Later the Hova held these legendary folk in great reverence, worshipping their spirits from whom they claimed their kings were descended. Prehistoric tombs, consisting of huge piles of stones, said to be the burial places of the Vazimba, are found in many places among the hills of Imerina, and are still regarded with awe by the people. The Hova, who have always kept themselves strictly apart from other Malagasy tribes, seldom intermarrying, are but one of the many peoples who have settled in Madagascar; the others are believed to have come originally from Arabia, East Africa, India, and the South Seas, and, according to Sibree, a large proportion of them have many points of connection with the Melanesian tribes from whom much of the darker element in the inhabitants is probably derived. These peoples have frequently intermarried, with the result that in Madagascar to-day may be found all shades of colour in the

45°
50°
Grande Comore
Archipel des Comores
Mohéli
Pomboni
Anjouan
Dzaoudzi
Ile Mayotte
Diégo-Suarez
(Antsirana)
Nosy-Bé
Hellville
Analalava
15°
Majunga
Maroantsetra
Bé d'Antongil
Ile Ste Marie
Maningory
Maevatanana
Lac Alaotra
Andreba
Maintirano
HOVA
Tamatave
Tananarive
Brickaville
Moramanga
Antsirabe
20°
Morondava
Ambositra
BETSILEO
ANTAMBAHOAKA
Mananjary
Fianarantsoa
Fanadiana
ANTAIMORO
Manakara
Vohipeno
Farafangana
BARA
Tuléar
Bé de St Augustin
Betroka
MAHAFALY
ANTANOSY
Ampanihy
ANTANDROY
Fort-Dauphin
Tsihombe
Ambovombe
Cap Ste Marie
25°
45°
50°
MADAGASCAR
Miles
50 0 50 100
Forests
Railways
Tribal names BETSILEO
Heights in feet
Route

Country near Mount Ikongo

Rice cultivation at Ambositra

Tanala woman with a bamboo for carrying water

skins of the natives, from very dark Melanesian and negroid types to the light olive-tinted skins of the Hova; all types, too, of hair from woolly and frizzy to sleek and straight.

I reached Madagascar in just under four weeks from Marseilles by the shortest route, *via* the Red Sea and down the east coast of Africa. After crossing the Mozambique Channel, we put in at the Comoro Islands to the north-west of Madagascar. These islands, belonging to the French, are mountainous and of volcanic origin, with tropical vegetation. I spent some while on Moheli and Mayotte, and was struck by the Arab and Indian influence which is very marked among the islanders, many being Moslems. There were also a number belonging to the Sakalava tribe from the west coast of Madagascar. They had settled in the islands when they were driven from their homes by the conquering Hova in the early nineteenth century, by which time the latter had succeeded in subduing most of the other Malagasy tribes and had installed themselves as rulers in Imerina.

Disembarking a week later at Tamatave, I reached Tananarive by rail. Forty-five years ago there was no railway and no roads: transport depended entirely on the filanjana or carrying-chair; to-day, through French enterprise, although railways are still very few and far between, a newly constructed road runs the entire length of the island from Diégo-Suarez in the north through Majunga to Fort-Dauphin on the south, and across to Tuléar on the west coast; and other roads, passable under good weather conditions, connect many parts of the country. Journeys off the beaten track and through the forests must still, of course, be made by filanjana. Here I would like to express my gratitude to His Excellency Monsieur Corbin, for valuable letters of introduction to the French Government of Madagascar; to M. Cayla, the late Governor-General; to MM. Decary and Poupon, and other officials throughout the country who gave me much kind help and made my forest journeys possible. Without their assistance I should have been unable to obtain the necessary porters; for, apart from missionaries who have their own men, very little travelling by filanjana is now done. I would also like to express my indebtedness to the Rt. Rev. Ronald O'Ferrall, until recently Bishop in Madagascar of the Anglican Mission, for much information regarding the Antaimoro tribe, and to Mr. Anderson, of Tsihombe, and other members of the American Lutheran Mission for interesting details respecting the Antandroy and other southern tribes.

After collecting stores and amassing as much necessary information as possible, I started southward for Fianarantsoa, having been told to proceed from there to the district of Fort-Carnot in the forest, where the native administrator would give me further information and help. I travelled as far as Antsirabe by rail, and thence continued by road to Ambositra, breaking the journey there for three days.

It was now the middle of May, the tropical autumn well advanced and the early mornings and nights up here on the high plateau very cold. As around Tananarive, the valleys in the mountainous region of Ambositra were all cultivated as rice fields, and the people, Betsileo, appeared healthy and prosperous. After the Hova, they are the most numerous and important tribe, numbering over half a million, and have progressed more in education and religion than

most: the L.M.S. and the Norwegian and American Lutheran Mission have done much for them, as the S.P.G. has for the Hova; a large number of both tribes are now Christians. The hair of the Betsileo is frizzy instead of smooth like the Hova, their skin much darker, and their features somewhat negroid. Like all the Malagasy, they are very superstitious, attach great importance to burial customs and to the power of their ancestors, and are invariably afraid of the spirits of the dead.

The Betsileo family tombs are somewhat similar to those of the Hova and are usually found near the roadside, surmounted by piles of stones. In common with the Hova, they practise the strange custom of bone turning, in these days restricted by the Government for hygienic reasons to the winter months of August and September. During this period the graves are opened and the bodies wrapped in new lambas—the national dress, hand woven, and for this occasion usually made from fine spiders' silk. I was told that the reason for this act was that the spirits should not feel the cold, and in consequence come and haunt their relations. The French administration has now forbidden bone turning till a year after death, and the ceremony is highly taxed. It is thus hoped to reduce the practice, which often results in plague epidemics caused by the number of rats overrunning the country as a consequence of the graves being opened.

I next reached Fianarantsoa, the centre of the Betsileo, and the principal town of the interior after Tananarive. It stands high up on a hillside, built thus originally for protection against invaders. It was from there that on May 23 I started off for the forest among the Tanala tribes.

A recently constructed mountain railway runs twice a week from Fianarantsoa down through magnificent scenery to the east coast at Manakara. I had arranged to leave the train at Manampatrana, a little wayside station halfway down the line, where porters and a filanjana were to await me, and whence I was to travel westward, up into the hills to Fort-Carnot. The train left at 7 a.m., soon after dawn. As is usual in early winter, there was a thick damp mist, and, as the sun rose, I could only dimly distinguish the densely wooded hills on either side of the line: thick jungle, becoming tropical as we reached the lower altitude, with gigantic crags looming out of the fog, and tangled undergrowth covered with a filmy maze of countless spiders' webs, glistening with dewdrops.

On arriving at Manampatrana two hours later I found my porters awaiting me. There were twelve stalwart Tanala tribesmen: eight for myself and the filanjana, and four for my baggage which was swung from two long bamboo poles, each pole supported on the shoulders of two men. The filanjana, a small wooden chair, with arms and a swinging footrest, was slung in the middle of two poles and carried by four men, the two ends of each pole resting on their shoulders. I had brought with me from Fianarantsoa a Betsileo boy as personal attendant; he spoke a few words of French and would, I hoped, be able to interpret for me to the porters who spoke only Malagash.

And so in glorious sunshine, the mists having rolled away, I started off for the two days' trek to Fort-Carnot, a small hill village where lived the Chef de Canton, the native Government official for the district, M. Mandimbilaza.

He was descended from the late King of the Tanala, and has wisely been given this post of authority among his own people, who regard him with great respect. He spoke excellent French, welcomed me on arrival, and told me he was prepared to assist me in every way possible, having received instructions to that effect from the Government at Tananarive.

After a night at the Government rest hut at Fort-Carnot, I started off at dawn the next morning for Antarambongo, a remote village high up in the hills beyond Mount Ikongo. The Tanala Ikongo, the people around this district, live on the tops of hills and have come little into contact with the outside world. M. Mandimbilaza told me that the village I was anxious to visit was one of the most interesting, but so difficult of access that people rarely went there, and he insisted on sending an armed soldier with me, more for prestige than for anything else, the Tanala being a most friendly people in every way. Jean, the soldier, belonged to this tribe; having been to France for military service he spoke good French, and proved invaluable as an interpreter, my Betsileo boy having failed in this respect.

After passing for some distance through a lovely valley, and following the shore of a river where women were collecting water, carrying it in hollow poles of bamboo on their shoulders, we crossed to the opposite shore in relays by means of a frail raft composed of a dozen or so long bamboo poles lashed together with bands of creeper. Our track now struck up into the hills near Mount Ikongo. My porters were amazingly skilful, carrying me in my chair up steep mountain-sides and down again by precipitous rocky tracks, covered with loose stones, while I was tilted at times right back and at others forward to such an extent that I frequently found myself standing on the footrest, while I was forced to cling on to the arms of the chair for safety. There were many streams, some of them foaming torrents through deep defiles which had to be crossed by means of one or more tree-trunks laid casually across. But nothing daunted, the porters, with steady balance, invariably landed me and my baggage safely on the other side. And so on, up and down for hours, over one hill after another and through densely wooded valleys, where the forest scenery was a fairyland of palms, giant ferns, and bamboo of all kinds, the track appearing to pass through a tunnel of green, where the branches met and interlaced overhead. Of particular beauty was a very tall palm which grows in one long slender stem, crowned with fringes of delicate green leaves which bent gracefully over like the lash of a whip. These feathery trees were in striking contrast to others of dark and heavier foliage, and to the dense surrounding undergrowth and dwarf shrubs of many varieties, intertwined with trailing masses of grey lichen and covered with moss of all kinds.

Had it not been for the fact that my porters kept up an incessant chatter, telling each other stories and folk tales—a favourite habit of theirs and calculated, as they think, to scare away evil spirits—I should have been struck as I was on other occasions by the uncanny stillness of the forest, and the apparent absence of animal life and the scarcity of birds. On the other hand, there was abundance of insect life, beautiful butterflies and dragon flies were exceedingly numerous, and spiders of all kinds and sizes were legion, the undergrowth, and often my track, being netted with their fine silky webs.

It is a curious fact that, although according to geologists Madagascar once formed part of Africa, practically no wild game belonging to the great continent is found in the jungles of Madagascar. On the other hand, there are numerous lemurs, slightly resembling monkeys. These animals are difficult to find, but I came across some of them later, in a forest belt in the south. They appeared asleep, and were high up in the tree-tops. When disturbed, by the shaking of a branch, they leapt from tree to tree with astonishing agility. The lemurs of Madagascar are peculiar to the country, and there are forty species mostly living in the tops of high trees as described and sleeping as a rule during the daytime. Crocodiles abound in the rivers, and there are many snakes of a harmless variety. A curious feature of the upper and lower forests are the number of enormous ants' nests, some as large as footballs, built in the branches of trees. I saw many such: they appeared to be formed of dark brown earthy matter and were full, I learnt, of a small black ant.

It was late afternoon when I saw on the ridge of a hill a village, just a cluster of bamboo huts, similar to some through which I had already passed. In every case I had been welcomed in the most friendly way, the Chief invariably wishing to present me with gifts of live fowls, eggs, rice, and bananas. My filanjana was hung around to an embarrassing extent by these offerings, none of which I had been able to refuse, for fear of offending the donors. The village ahead was Antarambongo, and, as we approached, all the people crowded together to watch our arrival. After I had stepped out of the filanjana, most of the women, after one hasty glance at me, ran away into their huts, apparently rather scared. The men were bolder, crowding round the porters and Jean, full of curiosity. I was welcomed by the head man of the village, presented with a gift of eggs, and in due course shown to a hut that had been kindly vacated for me for the night. The walls of this hut, in common with the best built Tanala houses, were of bamboo, flattened out and plaited together, the cracks filled in with dried palm leaves, while the roof was thatched thickly with the same. The floor, raised on posts a foot or so from the ground, was covered with plaited rush mats, except for a small space to one side where some large flat stones formed a rough cooking place, and on which there were the remains of a wood fire. There were two doorways with a couple of plaited straw screens made to rest over the opening. When it was desired to close the house, a leather thong attached to the inside of the screen was the only and somewhat inadequate way of fastening the door. As there was no opening for a chimney, the walls were blackened with soot, long strings of which hung in festoons from the rafters. The household goods and cooking utensils were placed on a couple of wooden shelves, one above the other, high up near the roof, as a precaution against the rats with which these huts are usually overrun.

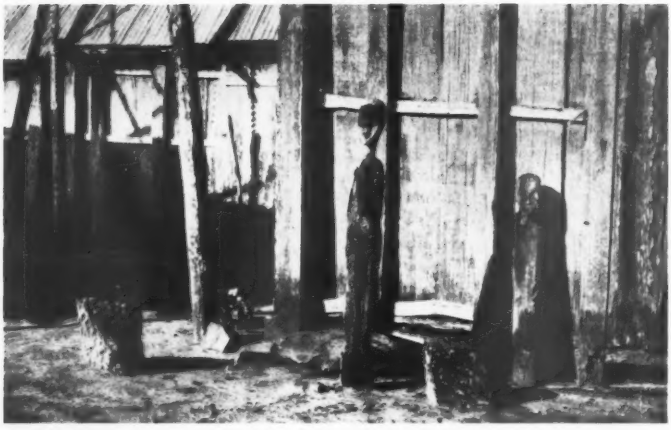
By 5.30 it was dark. I had shut myself in and was writing by candlelight, when I heard tomtoms beating outside and loud rhythmic chanting. I opened the door and immediately an excited crowd of men and women led by two male dancers, the latter swinging rattles, and naked except for loin-cloths, grouped themselves in front of the hut and started to sing and clap their hands. Jean, who had pushed his way through, whispered that the people were going to dance in my honour, and were saying "We are so pleased, so

A Tanala burial place

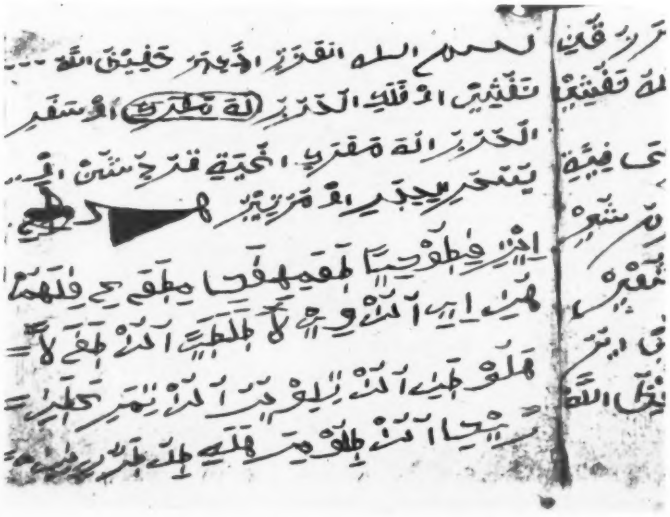
A filanjana at a Tanala village

A Tanala village with a place of sacrifice

Kobany bilo ceremony



Effigies at Ivato in honour of the ancient kings of the Antaimoro



Extract from a Sora-be holy book

pleased, at last a white woman has come to visit us." I was the first, apparently, they had seen. After the song was finished, a war dance was performed, the men brandishing axes with short wooden handles, while the women clapped their hands in unison. I finally said "Velòma" (Farewell) to the people. "Velòma! Velòma!" they replied, delighted. Once again I shut myself into my hut. The people dispersed, but hardly had I put out my candle and settled down for the night when the tomtoms and dancing recommenced round and round my hut, only to cease when a violent rainstorm drove the revellers, much to my relief, into the shelter of their homes. Wherever I went in the Tanala country I always met with the same spontaneous welcome and gaiety, and of all the Malagasy primitive types with whom I came in contact, I found the Tanala the most friendly and attractive.

"Tanala" means "people of the forest," and applies not to one particular tribe, but to various groups who have entered the territory from time to time, and have lived in the district for several generations. There are two main divisions—the Tanala Menabe, who occupy the more northern forests, and the Tanala Ikongo, among whom I travelled beyond Fort-Carnot. The Tanala Ikongo proudly claim they were never conquered by the Hova. Their villages, built on hilltops, were easily defended against invaders, and in time of war the people took refuge on Mount Ikongo from which they take their name; the summit of this mountain was level, cultivated, and provided food during sieges.

The dress of all the Tanala is similar. The women wear either a mat of finely plaited straw sewn together up the side, forming a sack-like garment, fastened with a cord round the waist, and in cold weather pulled up sufficiently high to cover the bosom, or else a similar garment of hand-woven raffia cloth gaily striped with colour, generally black, blue, and red obtained from vegetable dyes. Their babies are carried on their backs, after the general fashion. The Tanala are skilled in basket-work and weaving, and the men, in addition to a loin-cloth, wear a short tunic of finely plaited straw and a small skull cap of the same. A similar cap is worn by the women. In cold weather and at night the men wear the lamba, toga fashion, for warmth. As a rule the Tanala are rather small in stature, and not so dark as some of the other tribes. The women are often handsome when young, with round faces, rather high cheek bones, somewhat squat noses, but lovely eyes and full, well-formed lips. They wear their hair in numerous ringlets composed of tiny plaits set stiffly with grease, for which castor oil was often substituted. Once arranged, the coiffure is allowed to remain for weeks before it is re-dressed.

Superstition is rife among the Tanala, and much of their religion is connected with charms which, similar to those employed in Imerina and sold at the markets, consist not only of beads of all kinds but of compounds of vegetable substances, or earth, bones, dead insects, etc., wrapped in a cloth and enclosed in a small wooden box. The Tanala have charms for everything, including those to aid the village, the family, and the individual. Those concerned with the latter are the most numerous and are used to avert sickness, injuries from lightning or crocodiles, and to counteract the evil power of an enemy and render his charms useless. There is a widespread belief in lucky and unlucky days, and almost every village has its magician or *ombiasy*,

skilled in the art of divination, who is supposed to act as a medium with the spirit world, and to give advice when needed.

The next morning Jean inquired if I had been disturbed in the night by persons tapping on the walls of my hut; no doubt he had in mind the *mpamosavy*. These people, who may be either men or women and are believed to be witches and wizards, practise evil for the love of it. They not only frighten others by pretending to lay spells upon them, but are constantly up to all kinds of tricks, chiefly during the night, just for the sake of mischief. Witches appear more numerous than wizards; they steal out after dark when all the village is asleep, completely nude except for a white cloth wrapped round the head. Often they will tap and scratch on doors of houses, running away if the owners appear, or they will dance on tombs, and ride the cattle, breaking down fences and generally making a nuisance of themselves.

I certainly had heard a tapping on my hut during the night, but had taken no notice, and it soon stopped. More startling was an experience at another village, when I was suddenly awakened by a large and heavy object falling half over me. Lighting my torch, I found it to be the bamboo screen door which had fallen inwards across my camp bed. Whether it had been blown down by accident or pushed inside by one of these so-called witches I shall never know. I was interested to find in the central open space of this village a heathen place of sacrifice. It consisted of a tall wooden pole with a forked top. At the base were a couple of large rounded stones with grass growing in between, and to the right a pile of further stones upon which sacrificial oxen were killed and afterwards cut up for feasting. During my stay here there was much dancing and singing round this strange altar post at nights.

Like the other tribes, the Tanala believe in a benign creative spirit who lives in the sky, and whom they call Zanahary; they also believe in a race of Nature Spirits, good and evil, who inhabit the forests; but in common with all the Malagasy, most importance of all is attached to ancestor worship and to the spirits of the dead, with whom they believe they remain closely in contact and who, if not propitiated, may do them harm. After I had packed up and was ready to leave, the Chief's wife, made very happy by a gift of a bead necklace, squatted on the floor of my hut and appeared to be saying a prayer. Jean explained that she was asking the Great Spirit who lived in the sky to protect me from the evil spirits of the forest. And so I said good-bye to these simple folk, who by now had quite lost their shyness and crowded around my filanjana crying "Velòma! Velòma!" as they sped me on my way.

During my return journey I took a different and less frequented route, in order to find if possible one of the hidden burial places of the Tanala. Unlike all the other tribes, who bury their dead in elaborate and conspicuous tombs of various kinds, these people merely wrap the bodies in lambas, placing them in a cave or beneath an overhanging rock in some inaccessible part of the forest. From the narrow track I was following, through a tunnel of green, I saw at last just such a cave, down in a hollow on my left, beyond a tangle of dense undergrowth and swamp, and backed by a steep and rocky cliff. Jean whispered that it was a burial place. I noticed my porters had become unusually silent. On asking Jean if there would be any objection to my taking a photograph, he said he thought not, as he had spoken to the men and

Antandroy tribesman

An Antandroy dwelling

A Mahafaly burial place

A Mahafaly tribesman

they probably did not understand. I managed to reach the cave on the back of one of the porters who carried me through the swamp, and took what I was told afterwards was the first photograph of such a burial place. The bodies were not buried under the ground, but laid either beneath a light covering of boards or in rough open coffins of hollowed-out tree-trunks. I noticed one body thus exposed, wrapped in a pink lamba; small stones, placed as memorials, rested on the top of the covering of boards. These tombs of the Tanala Ikongo are called *kibory*, and are said to be rather similar to those adopted by certain other tribes on the south-east coast, bordering on the Tanala territory.[1]

After leaving the forest tribes of the Tanala I went down to the south-east coast where, at Vohipeno, I found myself among the Antaimoro, a people of Arab descent with characteristics peculiar to themselves. Near by was the village of Ivato, where lived the ancient kings of the tribe; the remains of their tombs may still be seen, enclosed within bamboo huts. Resting against the outside walls I saw several primitive wooden blocks with roughly carved human heads. I was told that sacrifices were offered before these effigies in honour of the departed kings. Local traditions say that at some early date, perhaps in the fourteenth century, a small party of Arabs, driven by enemies from Arabia, escaped in boats, two of which finally drifted to the south-east coast of Madagascar. Landing near Vohipeno, these men intermarried with the women they found there, and the present tribe is the result, claiming descent from these Arabs. These people keep themselves strictly apart from other tribes, never intermarrying. Their religion is a form of Muhammadanism, and they also practise astrology. The names of the Malagasy days of the week are Arabic in origin and are used all over Madagascar. This tribe have much of the Arab in their features, with a blending of negroid, more marked in some than others; and so proud are they of their clan that they insist on being carried home for burial however far the distance may be. They are enterprising traders, travelling all over the island, and consequently their corpses are sometimes carried for hundreds of miles back to their native village.

The houses of the Antaimoro differ from those of the Tanala: they are made not from bamboo but from the travellers' tree, the wood from the trunks forming the sides of the hut and the palm-like leaves, when dried, thatching the roof. The plaited straw garments and little straw caps worn by many of the people are similar to those of the Tanala. Each village has granaries for rice, like those I saw in Tanala villages, raised high from the ground upon poles, on account of the rats. I found the people very friendly, and the women less shy than the Tanala. The wife of the descendant of the last king of the tribe, to whom I was introduced, is still spoken of as the Queen. She was a very good-looking woman of almost pure Arab type.

The ancient royal family were called Anakara and were famous for their learning. They were the first to reduce the Malagasy language of Malayo-Polynesian origin to writing. This they did in Arabic characters. Latin

[1] For further information on the habits and customs of these interesting people, I would refer readers to Ralph Linton's publication, 'The Tanala, a hill tribe of Madagascar,' Field Museum of Natural History, Chicago; Anthropological series, vol. XXII, 1933.

characters were not used until 1820, and at one time the Arabic form of writing called *Sora-be* ("large or important writing," possibly meaning "holy," owing to its containing extracts from the Koran in special books) was used even outside the area of the Antaimoro, the Hova rulers employing men of this tribe as their letter writers, and making them responsible for fixing the calendar and keeping the times and dates. It is interesting to note that this system of writing is simplified from pure Arabic and is peculiar to this one tribe, no other people using the same script. A certain number of the Antaimoro continue to-day to write in this ancient script on local paper made from the bark of trees, as I saw for myself, a young man copying for me extracts from a *Sora-be* holy book belonging to his family. These books, of which only a few are in existence, are considered very precious and contain four different types of matter: quotations of a somewhat mixed nature from the Koran and Islamic teachers; sagas in prose recounting battles and noble deeds; a section on astrology and divination, which still remains the background of much of the Malagasy religion; and a section on wills and testaments.

Through the help of the French Government official of the district in finding me porters and a filanjana, I was able to visit a remote hill village whose people belonged to the Antaimoro. To reach it I passed through forest scenery quite different from that of the hilly country of the Tanala. After following the coast for some distance with the sea on my right and a great lagoon on my left, I crossed the latter in a native canoe, and from there struck into dense jungle. The tiny woodcutters' track was completely overgrown in places with thick undergrowth, through which a trail had to be blazed with axes. It was intensely hot and damp, and we were rather troubled with leeches dropping on us from overhanging greenery. In between patches of forest we had to cross deep gullies and valleys with bogs and pools of stagnant water, very malarial and unhealthy. The porters frequently sunk to their knees, and once they carried me across a wide stream with the water above their waists, holding me sufficiently high over their heads to clear my feet of the water. Now and then we struck open country, sweeping stretches of downland, with sheltered hollows containing fine examples of the graceful travellers' tree (*Ravenala madagascariensis*), a beautiful palm noted for its constant supply of good water (obtained by splitting the base of the leaves at the stem) and found everywhere on the lower levels of the south-east of the island. The village, when I reached it, was well worth seeing, for the people were of a more primitive type than those at Ivato, and very similar to the Tanala.

After some difficulty I managed to hire an ancient car, which broke down five times *en route*, to take me northward along the coast to Mananjary. The road was merely a sandy track in places, and we crossed seven lagoons on rafts. Finally I returned to Fianarantsoa, a two-days' journey, by public mail car from Mananjary. This is the only reliable way of motoring in Madagascar, and shortly afterwards, again by mail car, I started off at 4.30 a.m. for the three-days' drive to Fort-Dauphin in the south. Ten days were spent at this lovely little coast village, backed by high mountains, and with semi-tropical vegetation, reminiscent of the French Riviera were it not for the beautiful orchids and other flora peculiar to this part of Madagascar. I was

fortunate in finding near here a good example of a particular form of pitcher plant (*Nepenthes madagascariensis*), of which I was able to collect some specimens for the British Museum (Natural History).

I was now among the Antanosy tribe, a primitive people, darker and more negroid than the Antaimoro, with woolly hair, flat noses, and thick lips; and yet with a strong mixture of Malay and Arabic influence. Ancestor worship and fear of malignant spirits seem to form the background of their religion. I came across several of their burial places, large upright stones, decorated with cattle horns. It is customary for a man's entire herd to be sacrificed at his death, and the horns placed on the memorial stone. His friends and relations feast on the meat for several weeks, as all of it must be consumed. The bodies are not as a rule buried beneath the stones, but in a dense thicket near by. This place is considered sacred, no one daring to approach it, and the trees are never cut down. I noticed the remains of some coins which had recently been burnt beneath one of the memorial stones to propitiate the dead person. So great is their fear of the deceased, I was told by missionaries, that native parents frequently call their offspring by as ugly a name as possible, such as "Pig Face," "Manure Heap," or "Mr. Bad Crocodile," in order that the spirits may think they have no love for the children and will leave them unharmed.

Leaving Fort-Dauphin, I managed to hire a car with a good native driver, a Hova, who spoke French, and drove across the south of the island to Tuléar, there being no Government mail cars across this very unfrequented and desolate part of the country. The journey took several days, two of which were spent at Tsihombe, near the most southerly point of the south coast, among the Antandroy tribe. Between Fort-Dauphin and Tsihombe the scenery is entirely different from anywhere else in Madagascar, with a vegetation of its own. We passed through deserts of scrub, and forest belts with the bottle-shaped baobab trees, flowering aloes with a flaming red blossom, and cacti of many varieties. Most strange of all are the *didiera* and *fantsiholitra* trees, the trunks of which are tall, slender, and covered like the branches with short sharp spikes bearing tiny fleshy leaves of bright green. With their attenuated branches silhouetted against the sky, they resembled skeleton hands with long bony fingers outspread. We passed through miles of uninhabited country, no villages, no people; great stretches of virgin forest on either side of the road, and no sound except for the occasional shrill cry of a lemur.

Tsihombe, where I stayed at the American Lutheran Mission, was a good centre for seeing the Antandroy, a strange and primitive people, who, like others in the south, own large herds of cattle. They live in tiny huts with openings so small that they are forced to crawl in on hands and knees. The huts are one-roomed with three separate openings: one for the man, another for his wives in front, and the third for the children at the back. At night the man sleeps alone, his wives in an adjacent hut, and the children in yet another still smaller, made mostly of straw. The old women of the village sleep as a rule with the children. The Antandroy dress their hair in numerous tight round plaits against the head, plastering it with the fat of oxen, and they also rub the grease on their arms and necks to keep the flesh supple, but the odour of the

fat, especially in the hair where it soon becomes rancid, is most unpleasant. I noticed the faces of both the men and the women were tattooed. So fanatical is the belief in lucky and unlucky days that until quite recently children born on a Thursday were invariably buried alive under ant-heaps or laid on the ground to be trampled to death by cattle. I spoke with a man, his face terribly scarred, who had suffered this fate as a baby, but who, fortunately, had been rescued by the missionaries; he is now pastor of the Lutheran Church in Tsihombe. This practice still exists, so I was told, in very remote districts where the people hope it may pass unnoticed.

Continuing towards Tuléar along a rough road, only possible in dry weather, I passed through a waterless desert region where, unlike other parts of Madagascar, there is no rain for long periods. I had been warned to take a good supply of water with me in case of a breakdown on the road. I saw many people carrying large water-pots, tramping many miles to the nearest well. So scarce is water here that the people have accustomed themselves to take a drink only every other day. Washing, of course, is out of the question.

The next night was spent at Ampanihy, in the heart of the Mahafaly country. This tribe is similar in appearance to the Antandroy and, like them, depends on cattle for a livelihood. The men wear little except loin-cloths, and all carry javelins. They wear a portion of their hair in long tiny plaits, hanging down over their foreheads. The Mahafaly bury their dead in family tombs beneath large piles of stones, adorned with cattle horns, similar to those I saw among the Antandroy, but with one difference. In addition to the horns, they are decorated with totems, tall carved wooden poles, some depicting human figures or birds. These tombs are found only in this part of the country and are peculiar to the Mahafaly. I was taken to see the present head of the tribe, whom I found outside his hut. He still regards himself as a king and gave me the native greeting with hand upraised. I was told he had succeeded in burying one of his babies alive under an ant-heap, it having been born on the unlucky day of Thursday; fortunately the child was rescued none the worse for the experience by a native Christian. In comparatively recent times the kings of the Mahafaly had their slaves buried alive with them at their funeral, a custom also forbidden by the Government under penalty of severe punishment.

Towards Tuléar the road followed the river Onilahy, with luxuriant forest scenery, sloping upward from its banks. Tuléar was reached on July 5. Like other ports, it was very cosmopolitan, and I found many Indians and Arabs here as well as the Malagasy. The latter belong to the Sakalava Vezo tribe, are fisher folk, and are connected with the Sakalava proper farther north. Like all the other tribes, the Vezo have great faith in witch doctors, and among their curious ceremonies is the hysterical *kobany bilo* for healing the sick.

A Frenchman I met, M. Basset, who had witnessed the ceremony some years ago, gave me a detailed description of what he had seen, together with photographs, the only ones in existence, that he had managed to take. He told me how a woman known to him in a Vezo village had been very ill for some while. All attempted cures having failed, the witch doctor was called in, and according to his instructions, a young and healthy woman, granddaughter of the sick person, volunteered to take temporarily upon herself the illness. According to custom she lay beside the sick woman for several days,

while the villagers, led by the witch doctor, beat tomtoms, dancing and chanting continuously, until at last both women passed into a state of hysteria. They then arose, under the command of the witch doctor, and danced to the place of the *kobany bilo*, a high platform with a ladder set up against the hut. After both women had been anointed with grease and their hair dressed in a special manner, the young girl mounted the platform where she remained seated in a dazed condition. The sick woman, now very hysterical, was dancing below, and when he saw she was on the point of exhaustion, the witch doctor ordered her also to mount the platform and sit beside her granddaughter. Still dancing, she obeyed him, and shortly after both women collapsed and became unconscious. When they revived, some while later, the sickness had apparently passed to the young girl, while the old woman was completely cured. Twenty-four hours after, the girl also recovered and was none the worse for the experience. The *bilo*, or hysterical dance for sick persons, exists among other Malagasy tribes, but whether in this particular form I was unable to discover.

I returned north to Antsirabe by the "Transud" public mail, a four-days' journey starting before dawn each morning. The road was very bad in places, but the native driver skilful; frequently we had to cross streams and dried-up river beds over frail bridges on which there was only just room for the heavy car to pass. The driver took these bridges at a high speed to avoid the danger of their collapsing. The scenery varied from great stretches of desert country, bare and monotonous except for occasional groves of giant coconut palms, to wild and rocky volcanic hills as we neared the high plateau once more. The change in climate from the tropical heat of the coast to the bitter winds and cold rarefied air at Antsirabe and Tananarive was very marked. Another couple of days' motoring, first through mountain scenery and then down once more to the heat of the coast, and I reached Majunga on the north-west of the island, whence I sailed for home.

If, by these few remarks and observations, I may perhaps be the means of inducing other travellers who, unlike myself, can claim to be specialists in their subjects, to visit Madagascar in the future, I feel my journey will have been worth while, for, in spite of what has already been accomplished, there appears still to be much scope for scientific work, especially in the south of the island.

DISCUSSION

Before the paper the PRESIDENT (Field-Marshal Sir PHILIP CHETWODE) said: It gives me great pleasure to introduce this afternoon Mrs. Olive Murray Chapman, who is well known to Fellows of the Society and has spoken to us on other occasions. Her journey in 1939 to Madagascar was the subject of an excellent film in colour shown to the Society last November. When in Madagascar Mrs. Murray Chapman was especially interested in the customs, particularly the funeral and burial customs, of the less advanced native tribes. She has kindly undertaken to give us now an account of the more serious results of the journey which were so well illustrated five months ago.

Mrs. Murray Chapman then read the paper printed above, and a discussion followed.

The Rt. Rev. RONALD O'FERRALL (formerly Bishop in Madagascar): It is a great honour to have been invited to this meeting, and I have much enjoyed the

lecture by Mrs. Murray Chapman. I have seen parts of Madagascar on the screen to-night that I have never seen before, although I was in the island for over fourteen years and travelled over a great part of it.

I would like to refer to the Arab writing known as *Sora-be*. When I saw it being written I was interested to notice that, although read horizontally from right to left, it was written vertically, from top to bottom, beginning at the left-hand top corner of the paper: the writer turned the paper clockwise to read it. Apparently Arabic script is seldom written vertically. Since returning to England I have asked Dr. Herbert Danby, Regius Professor of Hebrew at Oxford, about it, and also Professor Diringer, one of the greatest authorities on old Semitic script, at present a refugee from Florence. Both say it is interesting and unusual for Semitic script to be written from top to bottom, instead of from right to left. I wonder whether the way the *Sora-be* is written can provide a clue to the origin of the Malagasy, and whether one might possibly be able to date one of the invasions from that method of writing. The same method is used in Chinese and in some scripts influenced by Chinese, for example the Mongolian. When the language is Arabic, *Sora-be* is easy to read; it is more difficult when Malagasy, depending primarily upon vowels which are usually omitted in Arabic, is used. I am no authority, but in a meeting such as this there may be some one who could throw more light on the question.

In conclusion, I would like to thank the President and Fellows of the Society for the invitation to be present; and also Mrs. Murray Chapman, Dr. Porter, and others who visit Madagascar and write about it. It is an island which we who live in it love very much. We are only too delighted when people come from England and elsewhere and carry away with them to their homes accounts of travel which may interest others in the island, so that we may have yet more visitors. There is a great deal in the backwoods and forests which has not yet been fully investigated by those who live in the island. An experienced traveller might easily light on something most important in a visit of only a few weeks.

Dr. C. R. PORTER: I was only in Madagascar for a month, but it seemed to be an exceedingly interesting and very beautiful island. Certainly there is enormous scope there for the entomologist and the botanist.

Can Mrs. Murray Chapman tell me whether the albino woman she photographed was suffering from dermatitis? I ask the question because when on the Congo in 1939 I saw a small boy of about twelve or fourteen years of age who was obviously an albino. He was living in the centre of Africa in one of the villages at which the steamers traversing the Congo stop. I photographed him and, standing close to him, noticed that he was covered with a skin complaint. The effect of the sun on his skin had produced dermatitis. We of course in this country get an erythematous dermatitis when we sun bathe, but it was somewhat striking to see this native boy affected in such a way.

Mrs. MURRAY CHAPMAN: I was told by the missionaries that the woman was a pure albino. She did not appear to have dermatitis.

Dr. PORTER: I congratulate Mrs. Chapman on the difficulties, inconveniences, and almost danger she put up with during her Mahafaly journeys. Only those who have looked at that country will realize its considerable difficulties.

The PRESIDENT: It only remains for me to thank Mrs. Murray Chapman very heartily indeed for what she has shown us. The island of Madagascar bulks very large when one sees it on a map of Africa; it even bulks large on a map of the world. Nevertheless, very few people know anything about it. It has been extraordinarily interesting to see the photographs and hear the country described in the skilful way in which Mrs. Murray Chapman has described it.

NOTES ON THE NORTHERN SEA ROUTE

PROFESSOR KENNETH MASON

IN the sixteenth century the English and the Dutch first tried to establish the North-East Passage, to find a sea-route to the Far East alternative to the much longer one by the Cape of Good Hope, controlled by Portugal. The attempts failed; the ships of those days were incapable of making the passage beyond Novaya Zemlya.

With the opening of the Suez Canal in 1869, there seemed less economic reason for the navigation of the North-East Passage. The increase in world trade however revived the idea in Russia, and in 1878 the Swedish scientist A. E. Nordenskiöld, with the financial backing of the Siberian merchant Sibiriakov, once more attempted the passage. He was eventually held up for the winter near Bering Strait, but in 1879, with his ship *Vega*, sailed back to Europe by the Cape route, thus being the first to circumnavigate the three continents of Europe, Asia, and Africa. It was a fine achievement and showed that passages in one season might be possible.

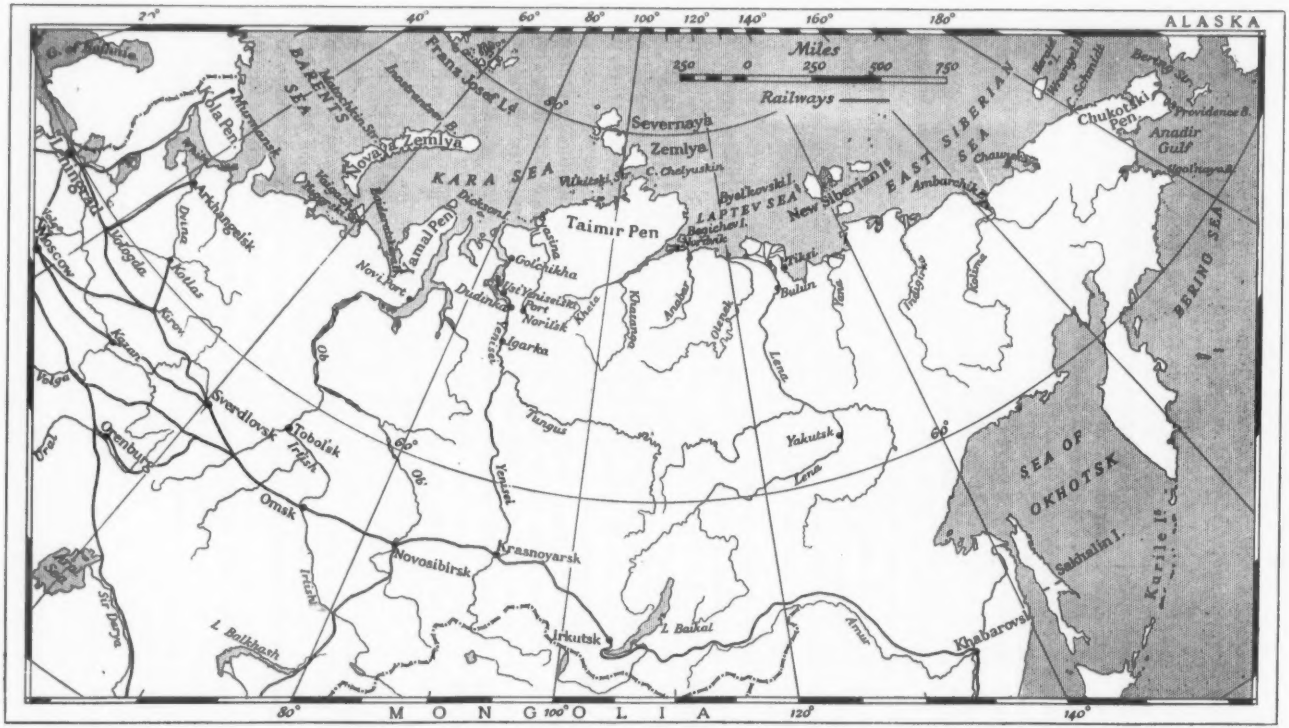
The Kara Sea trading ventures

Of more immediate value were the two trading expeditions organized by Nordenskiöld in 1875 and 1876. On the second of these, the steamer *Prōven* was the first vessel to carry merchandise from Europe to the Yenisei, and in the following year, 1877, the Russian sailing vessel *Utrennyaya Zarya* sailed from the mouth of the Yenisei with the first cargo to be brought back from that district. About the same time the Englishman, Captain J. Wiggins, one of the most energetic believers in the Northern Sea Route as a practicable proposition, began his cruises in the Kara Sea, conducting merchant ships from Europe to the mouths of the Ob' and Yenisei no fewer than ten times. The Society possesses a silver punch bowl, set of tankards, and salver, presented to Captain Wiggins by the Tsar Alexander III to commemorate this success.

After the days of Nordenskiöld and Wiggins, the Kara Sea was visited by a few merchantmen almost every year. The sea-route to the two great rivers was first used on a large scale in 1893, when 1500 tons of rail were carried on six ships from Europe to the mouth of the Yenisei, and then up that river for the construction of the trans-Siberian railway. In 1897, twelve vessels made the passage of the Kara Sea; in 1905, twenty-two ships carried 18,000 tons of freight to the mouth of the Yenisei. It was planned for the first time that an ice-breaker, the *Yermak*, should conduct the vessels through the ice; but she ran aground off Vaigach Island, and the ships completed the journey unescorted.

These and similar ventures proved that there was some economic justification for developing the navigation of the Kara Sea as far as the Ob' and Yenisei, in spite of the short open season of three months, and in spite of the hardships and risks involved. There were no aids to navigation, each journey was something of a journey of exploration; and there were as yet no prospects of further development.

Nevertheless there had been during this period a revival of scientific interest



Sketch-map to illustrate the development of the Northern Sea Route

in Polar exploration. As early as 1875 Weyprecht, one of the leaders of the Austrian expedition that had discovered Franz Josef Land, had proposed the collaboration of all countries in Arctic exploration, and a conference at Berne in 1880 arranged for the first Polar Year, 1882–83, in which many countries took part. In the years that followed, Nansen's drift in the *Fram* and the various attempts to reach the Pole increased our knowledge of the North, even if the scientific results were only fragmentary. With the invention of wireless a new scientific weapon of immense value was made available. Already in Tsarist days this fact was recognized. Plans were made to establish radio-meteorological stations on the shores bordering the Kara Sea route to assist navigation. In 1914 the first three stations were set up: at the northern shore of Vaigach Island, in 70° 24′ N., 58° 47′ E., to help the vessels through the Kara Strait; on the mainland at the eastern end of Yugorski Strait (69° 50′ N., 60° 46′ E.); and at Cape Marre (69° 43′ N., 66° 48′ E.), on the Yamal peninsula at the entrance to Baidaratskaya Bay. The following year another radio-meteorological station was established at Dickson Island (73° 31′ N., 80° 23′ E.).

The Laptev and East Siberian Seas

Some advances in the knowledge of the navigation of the Laptev and East Siberian Seas were also gained in Tsarist days. These two seas are separated by the New Siberian Islands (Ostrova Novo-sibirskiye), first visited by the Russian trader Liakhov in 1770, and partially reconnoitred in 1809–12 by Hedenström, both of whom operated over the sea-ice from the mainland. Important expeditions led by two naval officers, Wrangel and Anjou, in 1820–24, working with dog-transport on the sea-ice, had resulted in the general surveys of the continental shores from the Olenek river, west of the Lena, to Kolyuchin Island off the Chukotski peninsula, and of the New Siberian Islands, while the existence of the island now known as Wrangel Island was also suspected; its neighbour, Herald Island, had been discovered by Kellett in 1849. It was during a voyage of the American whaling captain Long that this island was located in 1867, but a more interesting physical fact was the discovery of an open sea, the Great Polynia, which is due, as is now known, chiefly to the constant drift of the central part of the Arctic basin ice ("the Arctic Pack") from the Beaufort Sea to the straits between Spitsbergen and Greenland. Little else however was known of the eastern part of Russian Arctic seas until 1911, for Nordenskiöld in the *Vega* had done very little mapping during his North-East Passage in 1878–79.

Knowledge of the eastern waters was extended by the important expedition which started from Vladivostok in 1911, under the command of the naval officer Sergejev. Two ice-breakers, *Taimyr* and *Vaigach*, each of 1500 tons, were specially built in Europe and despatched to Vladivostok by the ordinary sea-route. The survey was begun from the Bering Strait, and during the years 1911–14 the whole coast as far as Cape Chelyuskin was roughly surveyed. Sergejev died and was succeeded by Boris Vilkitski. The eastern shores of the Severnaya Archipelago were discovered in 1913 and the existence of the Boris Vil'kitski Strait, between this group and Cape Chelyuskin, was proved. In 1914 *Taimyr* and *Vaigach*, having passed these straits, were forced to winter to

Sketch-map to illustrate the development of the Northern Sea Route

the west of the Taimir peninsula, but they reached Arkhangel'sk the following year.

Coastal exploration from the land side

The northern part of Asiatic Russia and the Arctic shores were first examined by the Great Northern Expedition as long ago as 1733–43. This expedition was divided into sections, as was the whole coast from the White Sea eastwards. Each section reached its destination by descending the great Siberian rivers in small vessels constructed on the rivers themselves. One party reconnoitred the coast from the White Sea to the mouth of the river Ob'; another from the Ob' to the Taimir peninsula; a third worked westwards from the Lena delta to the Taimir peninsula and overlapped the second as far as the Yenisei mouth; a fourth examined the coast from the Lena to the Indigirka. Other parties worked on the shores of the Bering Sea, of the Sea of Okhotsk, and even off Alaska and among the Kurile and Aleutian islands. In so vast an enterprise at such a period, it is not to be expected that the accuracy of the surveys was very great, but the maps of northern Asia were based on the information gained on these expeditions for more than a century and a half, and it is only in the last five years that the final remnants of this great work have been superseded by modern surveys.

The Arctic Institute and the Central Board of the Northern Sea Route

Immediately after the Great War, in January 1919, a small group of scientists in Russia formed a Commission for the study of the Arctic. A comprehensive plan was drawn up, beginning with the examination of the Kola peninsula and Novaya Zemlya, but capable of expansion later. Twenty-three expeditions were equipped, and by 1925 the survey of the shores of Novaya Zemlya was completed, including much geological and hydrographical work. Two years later the seas between Novaya Zemlya and Franz Josef Land were investigated.[1] In 1925, the Commission became the Institute for Arctic Study, and in 1928 the Director of the Institute, Professor Samoilovich, led the expedition in the ice-breaker *Krassin* to the rescue of the crew of the *Italia*. This success led to further developments. In the Council of People's Commissaries a special Arctic Commission was founded, among the duties of which was the regulation of cooperation in the study of the Soviet Arctic. This development gave a great impetus to exploration of the Northern Sea Route, and led indirectly to the expedition of Professor Otto Schmidt who, in the ice-breaker *Sibiriakov*, made the first traverse of the Route in a single season, 1932, from west to east.

The psychological result of this spectacular achievement was considerable. It roused the greatest enthusiasm in the U.S.S.R., and immediately led the authorities to believe that the difficulties of the route had been overcome. In order to facilitate future developments, a new central organization was created, the Central Board of the Northern Sea Route, of which Professor Schmidt was appointed Chairman. By a series of decrees dated 17 December 1932, 11 March 1933, and 20 July 1934, this Administration was put in charge of all matters, economic and scientific, dealing with the country north of

[1] Franz Josef Land was discovered by Weyprecht and Payer in 1873; it was annexed by the U.S.S.R. in 1929, and in 1930 was renamed after Fridtjof Nansen.

lat. 62° N. These matters included all details connected with the development of the sea-route and its hinterland, the location, construction, and equipment of ports and refuelling bases, the economic exploration of fuel and other resources, hydrographic and other surveys, colonization and sovietization of the hinterland, and the provision of labour for development and research. Ice-breakers, wireless stations, and air services, as well as the Arctic Institute, the Economic Institute of the Far North, the Hydrographic Institute, the Aviation School, the Spitsbergen Coal Trust, and the various economic development trusts exploring for and exploiting resources in the territory, were all subordinated to the Central Board of the Northern Sea Route. Local administration is centred at Leningrad, Murmansk, Arkhangel'sk, Tobol'sk, Igarka, Yakutsk, and Vladivostok. The Central Board was associated with the National Commissaries of the U.S.S.R., and became a national administration of the first importance, corresponding in some respects to our Colonial Office. No funds were to be spared to make the colonial development of the Soviet Arctic a practical economic success.

Since 1932 an immense amount of exploration and survey has been carried out and many spectacular achievements have been recorded; but without belittling these achievements, it seems questionable whether a route established under such adverse physical conditions, though practicable with the expensive aids of numerous radio-meteorological stations, a fleet of ice-breakers, and a considerable air service for perhaps three months in the year, can ever be an economic success.

It is not possible in a short paper to detail the work of the large number of expeditions which have taken place during the last ten years, but a few salient aspects of the route will be discussed.

Polar stations

One of the first steps taken by the Russian scientists interested in the development of the Northern Sea Route after the Great War was to establish more radio-meteorological weather stations, or Polar stations, as they came to be called. In 1920, at Ust'-Yeniseiski Port, near the mouth of the Yenisei; in 1923, at Novi Port, on the Ob', and on the Matochkin Strait cutting through Novaya Zemlya, stations were established in order to assist navigation to the great rivers of western Siberia. In 1926 a research station was landed at Rogers Bay, Wrangel Island; in 1930, Sergei Kamenev Island, off western Severnaya Zemlya, and in 1931 Cape Zhelaniya, the northern point of Novaya Zemlya, were occupied.

These stations, whose personnel is relieved every two or three years if possible, like those set up earlier at Vaigach Island, on the Yugorski strait, at Cape Marre, and at Dickson Island, were primarily concerned with meteorological observations, taken five times a day according to international convention. They play an important part in weather forecasting, but in addition they served from the start as headquarters and bases for scientists and expeditions sent out on other tasks. The personnel at the Sergei Kamenev Island, for instance, made a preliminary survey of the greater part of the Severnaya group, by long journeys with dog transport, in the early spring. Other activities at these stations include research in magnetology, biology, and field geo-

logy, which may be carried out over a radius of 100 miles or more from the station. The more distant stations are provisioned for three years or more, and in some instances, such as Wrangel Island, it is often only possible to relieve or re-provision them by air.

The Second Polar Year in 1932–33 gave the Arctic Institute an opportunity of increasing the number of Polar stations, while the timely creation of the Board of the Northern Sea Route at the end of 1932 enabled many of the stations established for the Polar Year observations to be retained afterwards as permanent Northern Sea Route Polar stations. No less than seventy-six stations were manned by Soviet observers during the Polar Year work, while in 1935 there were seventy-two permanent or semi-permanent Polar stations. The distribution of these was as follows: Barents Sea and Novaya Zemlya–Vaigach region, 14; Kara Sea shores, 13; Kara Sea mainland, 13; Laptev Sea shores, 9; Laptev Sea mainland, 10; East Siberian Sea shores, 4; East Siberian Sea mainland, 3; Chukotskoye Sea shores, 6. There were thus forty-six stations directly available for cooperation with navigation. Several had already developed seaplane stations, and had become regular ports of call. In 1937 Professor Schmidt reported that the network of stations was then adequate for all purposes. By that date Dickson Island had 120 inhabitants; Tiksi Bay and Cape Schmidt had become air ports; Nordvik was "a growing town."

Ice-breakers

Though the ice-breaker *Yermak* was the first to be used in an attempt to escort trading vessels into the Kara Sea as long ago as 1905, it was not till 1921 that the *Lenin* proved the value of ice-breakers for this purpose. Since that date one or more ice-breakers were used annually to assist the Kara Sea merchantmen. After the creation of the Northern Sea Route in 1932 a number of other ice-breakers were made available for scientific work as well as for convoying. Those which appear most frequently in the records are:

Ice-breakers				
Krassin	built 1917	10,000 h.p.	8750 tons	2665 tons fuel
Yermak	1899	9500	8250	2650
Lenin	1917	7980	6000	1200
Lütke	1909	7900	3028	750
Ice-forcing ships				
Sibiriakov	1909	2000	2600	292
Russanov	1908	2200	2600	292
Sedov	1909	2360	3056	285
Malyguin	1912	2800	3200	300
Sadko	1913	3500	3350	250

All the above were built in foreign yards prior to the Soviet regime; many of them are small, and of the ice-forcing or ice-cutting type, not specially adapted for Arctic ice conditions. The *Yermak*, *Krassin*, and *Lenin* are the only three powerful enough to crush pack-ice with their weight, even the *Lütke*, though classed with the *Lenin* as an ice-breaker, being more of the ice-cutting class. The technique of ice-breaking has advanced since 1920, and it is realized that if the navigation period is to be extended at either end of the season when the

pack is heavier, far more powerful ice-crushers must be used. It was reported that in 1934 six new powerful ice-breakers were to be constructed in Soviet yards; in 1936 there were reported to be only four under construction; of these, only two appear to have been commissioned for use in the Arctic and nothing can be learnt of the other two. *Joseph Stalin* came into use in 1937, *L. Kaganovich* in 1938, while *Vyacheslav Molotov* is said to have been begun in 1937. The *Joseph Stalin* was built at Leningrad and was designed to deal with closer Arctic pack-ice; it is 356 feet long, 11,000 tons displacement, and has three steam engines totalling 10,000 h.p. Bows and stern are reinforced by cast-iron spurs weighing 21 and 31 tons respectively, and it carries two aeroplanes on deck. The other two are probably of similar design.

The ice-breakers have been used for scientific work, convoying, and to establish and re-provision Polar stations; many of these could not have been set up without their aid. Some have been temporarily fitted up as floating observatories and laboratories, carrying scientists and scientific assistants. Much of the hydrographic and hydrological work has been carried out on their voyages; many of the discoveries of land were first made by them. It was the *Sedov* that discovered Sergei Kamenev Island and the west coast of Severnaya Zemlya in August 1930, landing the personnel of its first polar station; the *Russanov* that relieved the station two years later; the *Sibiriakov* that made the first passage of the Northern Sea Route in the single season of 1932.

The difficulties and dangers they have to contend with are great. In December 1931 *Malyguin* went aground off Vaigach Island, and *Lenin* went to her assistance. *Malyguin* was relieved and reached port, but *Lenin* became fast in the ice and was damaged. In February 1932 *Krassin* was sent to her relief but was also imprisoned, and it was not till May 19 that *Krassin* with *Lenin* in tow reached Murmansk.

The following December (1932) *Malyguin* ran aground off Green Harbour, Spitsbergen, and sank in January, in spite of the efforts of three ice-breakers, *Sedov*, *Lenin*, and *Ruslan*. She was however refloated the same year and at work again in 1934. On the return journey the *Ruslan* was wrecked and lost off Spitsbergen at the end of April 1933.

A more recent instance of the difficulties met with by ice-breakers is afforded by the *Sadko's* experiences in 1937–38. The vessel left Arkhangel'sk on 26 July 1937, passed through Matochkin Strait three days later, and anchored on July 31 at Dickson Island. After assisting various vessels through Vil'kitski Strait and carrying out various research observations, she was at Tiksi Bay off the Lena delta on September 16, when she was called to the assistance of the hydrographic ship *Chronometer*, which had met with disaster in a storm. *Sadko* went to her assistance and rescued the entire crew on September 23. Three days later she received wireless orders to go to the north-west part of the Laptev Sea to conduct two cargo vessels through the ice. In spite of the lateness of the season the task was accomplished successfully. The *Sadko* then attempted in the latter half of October to pass through Sannikov Strait into the East Siberian Sea. She became fast in the ice to the west of Byel'kovski Island. *Sedov* and *Malyguin* were then sent to her assistance, but on reaching her they also became imprisoned, and all three

drifted helplessly northwards. The drift began at about lat. 75° 14′ N., long. 132° 20′ E.; at the end of February 1938, in spite of unfavourable weather, 184 persons were taken off by planes (lat. about 76°) and landed at Tiksi Bay, as soon as it was light enough to land on the ice. Thirty-three men were left on the ice-breakers with additional stores brought them by air. At the end of August 1938 the ice-breaker *Yermak* reached them at lat. 83° and freed them. The steering gear of the *Sedov* was however too badly damaged for her to make her own course unaided, and as it would have been dangerous to delay the others to take her in tow, she was allowed to continue her drift in the ice with a small party left on board. She subsequently followed much the same course as Nansen's *Fram*, and was freed at the end of her drift during the winter of 1939–40 by the ice-breaker *Joseph Stalin*.

The most important duties of the ice-breakers, though perhaps not the most spectacular, are to convoy Northern Sea Route shipping, particularly in the earlier and later parts of the season; to open and maintain open the straits; and to free ships that become fast. In an unfavourable season, such as 1936, most of the ice-breakers may be engaged most of the season in assisting merchantmen. In that year *Krassin* was engaged in convoying vessels into the Kara Sea to Dickson Island, while no fewer than five other ice-breakers operated to open a passage east of the Scott Hansen islands, towards the Vil'kitski Strait. A seventh, *Sibiriakov*, was imprisoned when trying to reach the convoy. In this year it was not till September 13 that, with the aid of *Lenin*, *Sadko*, *Sedov*, *Yermak*, and *Lütke*, the convoy passed Cape Chelyuskin and reached open water. Ice conditions then improved so much that *Lütke* and *Krassin* reached Bering Strait on September 23, while five of the merchantmen which made the complete passage from west to east passed Bering Strait on October 5 and 7. It had been intended that these should attempt the return passage westwards, but it was now, of course, far too late in the season. The difficult ice conditions in the south-east of the Kara Sea in this year were due to north-west winds through the summer, which had driven all the drift pack-ice towards the Taimir peninsula and south-western shores of Severnaya Zemlya, the western approaches to the Vil'kitski Strait being closed by heavily packed ice, though the strait itself was open in the middle of August as usual. The ice-breaker *Yermak*, having assisted the eastward convoy through the ice in September, then escorted two westward-bound vessels, the *Vancetti* and the *Istra*, which had left Vladivostok over two months (June 28) through the Laptev Sea and Vil'kitski Strait, handing them over to *Lenin* in the Nordenskiöld archipelago for further convoy. The vessels reached Igarka on October 2, and, having taken a cargo of timber on board, left again on the 6th, the *Vancetti* for London, and the *Istra* for Murmansk.

From the examples given above, it seems certain that no development can take place without more and heavier ice-breakers. It is too early yet to say what effect the *Joseph Stalin* and the newer types will have on the navigation.

Air services

Air services of the Northern Sea Route Administration come into two main categories: reconnaissance and transport.

Ice reconnaissance from the air first proved its importance in 1924. Since

that date this service has been steadily developed, and every year the ice conditions are now examined from the air during the month before navigation opens. This enables a time and course schedule for convoys to be drawn up, the selection of the Kara Sea entrance to be made for the earlier convoys, and a forecast to be made of the number and type of ice-breakers likely to be needed. During the navigation season seaplanes are posted at various open-water Polar stations and are available to be called to scout ahead of ice-breakers or shipping. Ice reconnaissance was still being carried out entirely by seaplanes in 1939, the planes being fitted with floats and skis. The latest types of ice-breakers are to carry two planes for their own use on deck.

The transport uses of the air service are hardly less important. Since about 1933 there have been operating air services from Omsk, Novosibirsk, and Krasnoyarsk along the Irtish, the Ob', and the Yenisei, as well as from Irkutsk down the Lena. A number of spectacular flights have been made to the Far East. Miscellaneous duties comprise the revictualling and relieving of isolated Polar stations, removal from these of sick persons to hospital, postal and passenger services, and such spectacular rescue work as that of the *Chelyuskin* passengers early in 1934 from the ice after their vessel had been broken up.

The number of planes in the service of the Northern Sea Route increased from 42 in 1933 to 125 in 1936. The present number in commission is unknown. Some of the early enthusiasm however seems to have worn away, judging by the report of Papanin, the new chief of the Northern Sea Route, in 1939. At the Party Economic Committee meeting of 1 December 1939, Papanin is reported to have said that Polar aviation had fulfilled the annual plan of passenger and postal transport in nine months. "But even in aviation," he concluded, "there are many defects: slack discipline, unsatisfactory repairing of planes, waste, and unnecessarily increased costs of operation" (*Izvestiya*, 3 December 1939).

Hydrographical charts and navigation marks

Prior to the creation of the Central Board of the Northern Sea Route little modern hydrographical survey had been completed except in the Barents Sea and along the direct routes to the Ob' and Yenisei rivers. This was due to economic reasons and lack of funds; vessels made soundings on their courses, but the results were difficult to coordinate. With the creation of the Northern Sea Route, the Hydrographic Institute was placed under its authority, funds were forthcoming, and a detailed programme of work covering several years was planned.

Since 1933 all the entrances from the west to the Kara Sea have been completely re-surveyed, charts redrawn, and navigation marks set up at critical points. The same applies to the greater part of the Kara Sea itself, especially west of Dickson Island. East of this point charts were unreliable up till 1937, when a number of hydrographical expeditions took place: (*a*) to the Nordenskiöld archipelago and west of the Taimir peninsula; (*b*) to Vil'kitski Strait and to the north-east part of the Kara Sea, work undertaken by the ice-breaker *Malyguin*; (*c*) to the Laptev and East Siberian Seas by *Sedov*, concentrating on the route from Vil'kitski Strait to Sannikov Strait; (*d*) to Sannikov Strait

itself by *Sadko*[1]; (*e*) along the Yakutian coast-line; and (*f*) in the neighbourhood of Chaunskaya Bay. It would seem that a considerable amount of work remains to be done in these eastern waters before modern charts can be prepared, though they may well be published for the southern shores. Up-to-date charts have been printed of the Arctic seas west of long. 85° E., but the state of progress east of this meridian is not known.

Navigation marks, lights, and D.F. stations have been set up through all the straits regularly used on the route, and instruction books are available to mariners. The courses of the Ob', Yenisei, and Lena have also been fully charted. But pilots are necessary. The development of the Pyasina, Khatanga, Anabar, Yana, Indigirka, and Kolima was ordered in the Second Five Year Plan, and seven hydrological expeditions were sent out in 1935 to operate for two and, in some cases, for three years. The Pyasina and the Khatanga were first navigated in 1935, the Yana is now navigable for specially constructed vessels, the Indigirka is navigable as far as the Moma tributary, the Kolima for a long distance; the Anabar was said to be navigable by an expedition that examined it in 1936. None of these rivers is however navigable for sea-going vessels, except the Ob' and Yenisei, the latter for about 300 miles as far as Igarka, so that transhipment for all the others must take place at their mouths.

In view of the various reports published during Professor Schmidt's chairmanship of the Central Board it would appear that very great progress had been made with hydrographical work throughout the route. It is however only right to add that there has recently been considerable criticism by his successor, Papanin. In his report made in December 1939 to the Party Economic Committee already mentioned, Papanin sharply criticized the hydrographical services. He stated that the most important sections of the route were misleadingly equipped with maritime signs and that islands were marked on charts where they did not exist. But so far as is known, Papanin has not travelled the whole of the Northern Sea Route, and most of the hydrographical work has been carried out by surveyors trained and sent out by competent authorities.

Merchant traffic

As already mentioned, some merchantmen traded with the Ob' and Yenisei in Tsarist days. In 1920 the "Kara Sea Expeditions" began, and a regular service was opened up during the annual navigation season with the aid of a single ice-breaker. In 1931 this western part of the Northern Sea Route between Russia's European Arctic ports of Murmansk and Arkhangel'sk and the mouths of the Ob' and Yenisei was declared to be "a normally operating sea-route." Transhipping operations until 1928 were carried out in Ob' Bay at Novi Port, and at Ust'-Yeniseiski Port. The Yenisei is navigable for sea-vessels for some 300 miles upstream, and since 1928 these operations have been carried on at Igarka.

With the creation of the Northern Sea Route Central Board after the *Sibiriakov's* passage of the route in 1932, the Soviet authorities ordered the

[1] It is not known how much of this work was completed before *Sadko* was set fast in the ice and the others were diverted to her assistance (see p. 33 above).

whole Northern Sea Route from Murmansk to Vladivostok to be converted into "a normally operating sea-route."

In 1933 Professor Schmidt attempted the through passage with the merchant vessel *Chelyuskin*, carrying passengers and stores. The ship was strengthened, but was not an ice-breaker. Leaving Murmansk on August 10, the vessel reached the Chukotskoye Sea at the end of September, where she was beset in the ice for a fortnight. After great difficulty she reached the Bering Strait by November 3, too late to get through to open water. The north wind was in control, the warm current from the south had slackened, and the straits were crowded with ice driven in by the cold currents and frozen solid. *Chelyuskin* was eventually imprisoned, carried west again, and crushed in the vicinity of Wrangel Island; the crew and passengers had to be rescued by air, the last being taken off to safety on April 12, just before the floe on which they were marooned broke up.

In 1933 the First Lena Expedition made the journey from the west to open up traffic with the Lena river, and to increase the river fleet there with vessels which had been constructed on the upper Yenisei. The ice-breaker *Krassin*, with cargo vessels and the new river vessels (a 1400-h.p. tug, an iron-sheathed lighter, and some barges), left Dickson Island on August 24, passed Cape Chelyuskin on September 7, and reached Tiksi Bay on the 8th. In the same year *Sibiriakov* with other vessels landed stores at Cape Chelyuskin on August 31, and left on September 13. Ice had already formed in the south-eastern part of the Kara Sea, and the ships only reached Dickson Island through 9 inches of sea-ice with the aid of three ice-breakers on September 30, while three vessels of the Lena convoy (*Tovarish Stalin*, *Volodarski*, and *Pravda*) were forced to winter off the Samuel Islands, south-east of Cape Chelyuskin.

In 1934 the ice-breaker *Lütke* made the first passage from east to west. Leaving Vladivostok on June 28, she passed Bering Strait on July 13, but was fast in the ice 27 miles east of Cape Schmidt (North Cape) soon after. She passed Cape Schmidt on July 26, reached the Kolima river on the 30th, and coaled at Tiksi Bay between August 4 and 9. Through heavy pack-ice 5 feet thick she reached the three vessels of the First Lena Convoy off the Samuel Islands, and brought them to open water on August 17. After spending four days in repairs, she passed without difficulty through Vil'kitski Strait, reached Dickson Island on September 2, and Murmansk on the 20th. In this year a Second Lena Expedition was safely escorted through the pack to the Lena without mishap.

In 1935 planned exploitation of the Northern Sea Route was taken up for the through route and the first merchantmen made the through passage. Four vessels succeeded in getting through, two making the passage in each direction:

Vessel	*from*	*on*	*cargo tons*	*to*	*arrived*
Vancetti ..	Murmansk	24 July	2552	Vladivostok	11 September
Iskra	„	24 July	2345	„	11 „
Anadyr ..	Vladivostok	23 June	2000	Murmansk	11 „
Stalingrad ..	„	25 June	2000	„	15 „

Anadyr and *Stalingrad* carried 408 passengers, 55 horses, and 15 cows, and delivered 4000 tons of cargo at the Kolima mouth. *Stalingrad* picked up a cargo of timber at Igarka. In the same year three other vessels delivered 6432 tons of cargo from Vladivostok at the Kolima mouth, while one ship reached the same place from Arkhangel'sk and returned to that port assisted through the pack by three ice-breakers.

In that year, 1935, the Kara Sea convoys comprised thirty-five foreign and ten Soviet ships, the first convoy passing Yugorski Strait on July 25, and the last vessel returning to Murmansk on October 10. About seven weeks in all were available at Igarka for unloading and loading convoys, shifts working for sixteen hours a day. 17,175 tons of "technical cargo" from Murmansk were landed at Dickson Island, Ust'-Yeniseiski Port, and Igarka. 5366 standards of timber were loaded at Novi Port on five foreign ships, and 44,236 standards at Igarka on thirty foreign and ten Soviet ships.

At the end of 1935 the whole through route was rather optimistically declared to be a "normal sea-route."

The year 1936 was one of bad ice conditions in the south-east of the Kara Sea. The Lena-Kolima convoy from the west as well as those vessels attempting the through passage were unable to get through the heavy pack east of the Scott Hansen Islands in spite of the efforts of five ice-breakers, before early September, and only reached Cape Chelyuskin on September 13. Conditions eastward were better, and vessels from the west passed Bering Strait on October 5 and 7. Fourteen ships altogether made the through passage while, including ice-breakers and research vessels, there were altogether 160 ships operating on the Northern Sea Route. Seaplanes flew altogether a total of 11,000 hours. At the end of the season however a number of vessels were caught in the ice. It was reported that "three flotillas of merchantmen wintered in the Laptev Sea," and that the crews of some ships had to be rescued by plane.

The details of subsequent years are less easy to find. Perhaps there was nothing sufficiently spectacular to report; perhaps fewer ships operated. It is significant that in 1939 the figures of 1936 were still quoted as remarkable. Only three vessels from the west and two from the east were scheduled to make the through passage in 1937, while sixteen ships were to take cargoes from the west and two from Vladivostok to the Lena and Kolima. It appears that some of these, as in the previous year, were fast in the ice at the end of the season.

Newspapers in 1939 reported that the powerful ice-breaker *Joseph Stalin* in that year had escorted ten vessels from the west to Ugol'naya Bay in the Anadir Gulf and brought them back to Murmansk. If this is so, 1939 was the first year in which vessels succeeded in passing through the Bering Strait from the west and in returning along the whole route in the same season. The vessels however did not make the passage to Vladivostok and back, which would have added at least three weeks to the voyage, and they were aided by the most powerful ice-breaker of the fleet all the way; it would seem that such a double journey is at present impossible.

The following statistics though fragmentary indicate the trade tonnage and number of merchant vessels using the Northern Sea Route since 1921.

Kara Sea convoys, 1921–32

Year	*Export tons*	*Import tons*	*Total tons*	*No. of vessels*
1921 ..	4877	8440	13,317	5
1922 ..	5837	7790	13,627	5
1923 ..	24	1076	1100	3
1924 ..	4148	6523	10,671	3
1925 ..	5582	7602	13,184	4
1926 ..	10,070	9098	19,168	5
1927 ..	11,114	13,314	24,428	6
1928 ..	17,107	12,271	29,378	8
1929 ..	60,060	13,500	73,560	26
1930 ..	125,000	18,000	143,000	40
1931 ..	49,165	14,445	63,610	16
1932 ..	76,480	20,283	96,763	28

Since 1933, the figures given are for cargo carried to all the mouths of Siberian rivers, from one river to another, and from one end of the route to the other. The following are quoted from the report given to the Council of the Northern Sea Route Administration in December 1936.

Total cargo carried on Northern Sea Route, 1933–36

Year	*Tons*	*Year*	*Tons*
1933	136,000	1935	230,600
1934	156,000	1936	271,100

Imports seem to have been throughout these sixteen years mainly provisions, technical machinery, construction materials, scientific and other equipment, books and equipment for cultural purposes, etc. Exports comprise mainly timber, fish, furs, some Anderma fluorspar, graphite from Igarka. In these years most of the fuel used on the route had to be brought in from outside. In 1936 the *Smolensk* carried a miscellaneous cargo from Vladivostok to the Kolima, proceeded to Tiksi Bay, whence she towed timber barges to Nordvik, and then returned to the Pacific with a small cargo of salt from Nordvik for the fish-canning industry.

Development of resources

A number of expeditions have been engaged during the last ten years on geological surveys and in prospecting for minerals. As a result, much has been written of the "vast resources" of the Arctic shores and hinterland. It is however still difficult to ascertain the success of these exploratory efforts. As soon as traces of a mineral are found, they are hailed as "resources," and before a detailed survey is made the mineral appears in lists of resources available.

A list of mineral resources claimed in 1934 to exist in the Soviet Arctic was published by L. Shishkova in the *Bulletin* of the Arctic Institute, Leningrad. Many of the deposits mentioned, even if large, would be difficult to exploit without overcoming great difficulties in transport, and in many cases no steps appear to have been taken to develop them. The list therefore indicates only that traces of the mineral mentioned have been found. Nothing that appears on the list away from the main lines of communications of the Northern Sea Route, that is, away from the accessible parts of the coast or away from the navigable rivers, can at present be classed as exploitable. With the exception of a small 70-mile railway from the Noril'sk mines to Dudinka

there are no communications in the immediate hinterland but rivers. Dog-sleigh and aero-sleigh in winter do not lend themselves to economic transport; in spring the tundra marshland is a great handicap to travel, and floods from rivers still blocked in their lower reaches by ice make impassable great stretches of lowland; in summer, perhaps for three months, development is possible if sufficient labour is available, but this labour must either be brought in for the season or fed in idleness for nine months of the year.

Comparing the list given by Shishkova (*Bull. arctic Inst., Leningr.*, No. 10 (1934), 37) with later accounts, it appears that the exploitable resources are:

(*a*) Copper, zinc,[1] asbestos, iron, lead,[1] in Novaya Zemlya, if they exist in sufficient quantities.

(*b*) Coal from (i) Noril'sk, near Gol'chikha, and from the Pyasina river, all of which are near the Yenisei or Pyasina navigable routes; (ii) the Kheta tributary of the Khatanga river and perhaps near Nordvik itself on the Nordvik route; (iii) the Sangarkhaiskiye (" Sangarskoe ") Mines and possibly Bulun and Tiksi Bay shore, on the Lena route; (iv) Ziryanka on the Kolima–Ambarchik Bay route; and (v) Ugol'naya and Providence Bay on the Anadir Gulf, north-west Pacific.

(*c*) Copper and nickel from Noril'sk, exploited *via* Dudinka on the Yenisei.

(*d*) Rock salt from the Nordvik neighbourhood.

(*e*) Graphite from the Lower Yenisei region.

Oil indications have been found in Inostrantsev Bay, Novaya Zemlya, on Begichev Island near Nordvik, and close to the shores of Chaunskaya Bay. If the indications are proved in sufficient quantities, they are close enough to the Northern Sea Route to be exploitable by pipe-line. Some recent optimistic reports have appeared regarding the Nordvik indications, but there is no reference to mechanical preparations for the development of oil in the Soviet Arctic. At present it may be safely assumed that no oil is in the productive stage. In 1939 Papanin reported that "valuable results have been achieved by the Nordvik expedition prospecting in Kozhevnik Bay, for oil, coal, and rock-salt." In fact, it was in 1933 that traces of these minerals were first found; they are included in the 1934 list, and in 1936 the first salt was mined and advertised as having reached the productive stage. Neither of the two other commodities have been so advertised, and it appears that prospecting is still going on. In *Pravda* on 6 September 1939, Papanin wrote: "Nevertheless, the problem of coal is still acute for us on the N.S.R.," and though he stated that there was no reason why the entire Arctic fleet should not be fuelled in the future from local sources, the only mines he actually mentions are the Sangarkhaiskiye, and those at Noril'sk, Ziryanka, and in Providence Bay.

> "Prospecting may still discover useful local fuel resources. In the region of Ust'-Yeniseiski Port a prospecting expedition is actively seeking oil, and the western Taimir coal prospecting expedition is looking for coal on the shores of the Kara Sea. . . . We have every reason to hope that in the near future big coal and oil industries will grow up along the N.S.R., which will provide fuel not only for the Arctic fleet, but also for the new settlements and towns arising on the Arctic coast. There should be no reason to import fuel

[1] Zinc ores were reported near the south shore of the Matochkin Strait, and lead in the north island of Novaya Zemlya in 1932. They do not appear in Shishkova's list.

to the Arctic, for the Arctic possesses its own natural resources of coal, oil, and rare metals" (*Pravda*, 22 November 1939).

It is difficult to imagine a more glaring instance of wishful thinking.

The timber industry, in spite of vast natural potentialities under efficient administration, has been very little developed, and the number of sawmills is astonishingly small. In 1937 the mills reported in operation were: 2 on the Lower Ob', 4 in the Central Ob' basin, 5 in the Yenisei basin, and 3 in the Lena. Of these, only one of the three mills of the Igarka combine, on the Yenisei, was considered up to date in equipment and productivity.

The Arctic hinterland is for many hundreds of miles within the tundra zone, and useful timber for export comes from far to the south even of Igarka. It has to be floated down the Yenisei for from 600 to 1000 miles, made up in great rafts, during the short open season of the rivers. Igarka, the chief timber port, trims and saws the trunks during the whole year; work is suspended in winter only when the temperatures fall very rarely below −85° F.; normally the work is carried on in winter by floodlight.

The output of timber is not limited by the exploitable volume available, but by the amount that can be cleared from the ports. Owing to the short navigation season on the Northern Sea Route, only about seven weeks are available for loading in a favourable year, from early August to late September, and without much improvement in loading facilities it would hardly be worth increasing the number of mills.

Other natural resources are fish, furs, and game birds, all of which are capable of much more development. Curiously enough, fishing and hunting do not appear to be spectacular enough to appeal to the Arctic "colonists," and the native inhabitants appear less inclined than formerly to undertake their natural and more primitive activities. It is true that under the Soviet regime fox farms and the breeding of fur-bearing animals have been developed, but not with the enthusiasm shown in the search for minerals.

Ports on the Northern Sea Route

According to the Third Five-Year Plan, commencing 1938, the basic ports of call to be developed were to be: Novi Port, Port Dickson, Igarka, Tiksi Bay, Kolima, and Providence Bay. Subsidiary ports with mechanized equipment were to be at Nordvik and on the Pyasina, Yana, Indigirka, and Anadir. Some of these refer to ports to be constructed at or near the mouths of the rivers so named. Varnek Bay in Vaigach Island, as a proposed subsidiary port, and other such ports in the Nordenskiöld Archipelago and Chaunskaya Bay appear to have been added to the list at a later date. Large sums were allotted for the development of several of these ports during the years 1938–42. It is uncertain how much has been done, but in September 1939 Papanin stated "we have no ports yet on the N.S.R.; we are only now constructing them."

The transliteration of Russian names: Place-names in Professor Mason's paper have been transliterated in accordance with P.C.G.N. rules. Personal names and names of ships have been left in their conventional forms, which are inconsistent amongst themselves and only occasionally follow the P.C.G.N.—Ed. *G.J.*

GERMAN SUPPLIES OF RAW MATERIALS AND FOOD

G. R. CRONE

Articles on various aspects of German self-sufficiency have appeared recently in several periodicals. In this note an attempt is made to summarize the whole position of German economic supplies. The sources used are '*International yearbook of agricultural statistics*, 1938–39,' *Rome*, 1939; '*International trade in certain raw materials and foodstuffs*, 1938,' *Economic Intelligence Service, Geneva*, 1939; '*The mineral industry of the British Empire and Foreign Countries: statistical summary*, 1935–37,' *Imperial Institute, London*, 1938; *current information in* International Review of Agriculture, *Rome. A survey of the colonial aspect is provided by E. Dennery:* '*Le problème des matières premières*,' *Paris*, 1939, *and an outline of German plans by J. Stoye:* '*Die geschlossene deutsche Volkswirtschaft*,' *Leipzig*, 1937. *Various aspects of economic self-sufficiency are dealt with in the* '*Oxford pamphlets on world affairs*' *and the general question is treated in detail by Eugene Staley in his* '*World economy in transition*,' *New York*, 1939.

AS a highly industrialized country Germany is dependent upon foreign sources for many raw materials used in her industries, and to a lesser extent for food supplies. In recent years her policy has been directed to self-sufficiency in food, to developing home sources of raw materials, even if they are of lower standards than foreign supplies, and to manufacturing substitutes for those materials which are not to be found or cannot be grown in Germany. Measures have also been taken to develop sources of supplies in accessible countries in Europe as alternatives to overseas areas. In addition, storage of imported materials and restriction of the consumption of certain critical materials has been carried out. The individual problems of agriculture and industry have been considered as a whole and their interdependence adjusted, industry, for example, receiving increased supplies of textile fibres from agriculture in return for synthetic fertilizers. When the present economic position of Germany is considered therefore, it should be remembered that the drive for self-sufficiency has been in progress for some years; that further progress in this direction must be more difficult; and that therefore the imports noted below represent, apart from storage, the necessities of an economy already "closed" to a considerable extent.

Considerable changes in the structure of German agriculture have recently been thus effected. It is claimed that by 1936 one-half of the area which had gone out of cultivation between 1913 and 1933 had been recovered by coastal reclamation, drainage, and rehabilitation. More recently however the total cultivated area, arable, pasture, and tree and bush crops, has decreased slightly, about 0·7 per cent. between 1936 and 1938, and the number of cattle and pigs, which increased by 9 per cent. between 1936 and 1938, has also declined. The fall in the cultivated area is largely due to increase in built-up areas, roads, open spaces, etc. Against this must be set the fact that more intensive methods, the introduction of improved strains, and the increased use

of artificial fertilizers have raised the yields, and that land has been put under more profitable crops. The yield of wheat, for example, has increased 10 per cent. Among the grain crops, the proportion of wheat, barley, and maize has increased at the expense of rye; more vetches, mixed clover and grasses, and a new variety of lupin (sweet lupin, 25,000 ha. in 1936; 63,000 ha. in 1938), have been grown for fodder, and industrial crops such as hemp, colza, and flax have expanded greatly. The object of these developments is clear, for as will be seen there is a serious shortage of cattle feed, which threatens meat, dairy, and fat supplies, while domestic supplies of textile fibres are completely insufficient. The maintenance of high agricultural yields requires that there be no diminution in the supply of labour or draught animals.

Germany produces all the wheat required for bread. In 1938 the harvest was 5·58 million tons,[1] a considerable increase on the five-year averages of 4·64 (1933–37) and 4·06 (1928–32) million tons. Nevertheless, 1·3 million tons were imported in 1938, a quantity three times that of the annual average 1933–37. The 1938 imports were thus approximately a quarter of the home harvest, and those for 1937 were also high. Forty per cent. of the 1938 imports came from the Danubian and Balkan countries, a similar proportion from North and South America, and most of the balance from British India and Australia. The amount imported in recent years has been approximately four times the total export of Hungary, and 50 per cent. more than the export of Romania.

The surplus of wheat thus acquired is available as a reserve against bad harvests, or for feeding to animals should the fodder supply be interrupted. A further supply of animal foodstuffs exists in the barley and maize stored. The home production of barley is considerable, 4·25 million tons in 1938 (average, 1933–37, 3·45 million tons), the imports being about one-tenth of this quantity, they too having increased greatly in recent years. The position with regard to maize is different. Though more has been grown recently for silage, the 1938 production was 180,000 tons only, in contrast to an import of 1·9 million tons. Here again imports have risen rapidly, the average for 1933–37 being 650,000 tons. In 1938 the United States and Argentina supplied 89 per cent. of the maize imported; in the preceding year Hungary, Romania, and Yugoslavia sent 26 per cent., and Argentina 72 per cent. The five-year average of imports is rather less than Romania's average export for the same period, and greater than the combined exports of Bulgaria and Yugoslavia.

This steady accumulation of grain imports (to which should be added rice, 244,000 tons in 1938) suggests precautions against the cutting off of supplies of oil-bearing vegetable products, which contribute to cattle food as well as to the fat supply and to industrial needs. Among the more important of these in 1938 were soya beans, 783,000 tons (1933–37 average, 737,000 tons); ground nuts, 312,000 tons (av. 300,000 tons); copra, 278,000 tons (av. 172,000 tons); palm kernels, 280,000 tons (av. 292,000 tons); and linseed, 155,000 tons (av. 264,000 tons). In addition about 90,000 tons of these oils were imported. With the exception of the soya bean and linseed, these are all extra-European products; 45 per cent. of the copra came from the Dutch East Indies and 24

[1] The combined German and Austrian production in 1939 was 5·61 million tons.

per cent. from British Malaya, while 90 per cent. of the ground nuts were imported from British India.[1]

Attempts to grow the soya bean in Germany have so far been unsuccessful. Its cultivation in the Balkans has been encouraged by Germany, and the production in Romania, Yugoslavia, and Bulgaria amounted to 83,000 tons in 1937 and 60,000 tons in 1938, all of which went to Germany. Linseed, which can also be grown in Europe, has been increasingly cultivated in Germany (42,000 tons in 1937; 23,000 tons in 1938), and is grown on a comparable scale in Latvia and Belgium; but these sources cannot meet the German consumption.

The annual import of the products enumerated above is approximately 2 million tons. Against the oilcake represented by this quantity now cut off, must be set the grain imported in recent years above immediate needs. Taking the 1933–37 average as the basis of annual requirements, in 1938 alone about 3½ million tons of wheat, barley, and maize were imported and presumably stored. To this alternative supply must be added the contribution of the increased potato crop. The production in 1939 reached 51 million tons, an increase of 10 per cent. on the average of the preceding three years (including the record year 1937, 54 million tons). About a quarter of the harvest is used for human consumption; the greater part is used in the manufacture of alcohol and for feeding stock.[2]

Providing the supply of fodder is maintained, Germany is practically self-supporting in meat (one-half supplied by pigs); and to a large extent in animal fats. Beef imports average about 60,000 tons a year, pork 40,000 tons, and bacon and lard 10,000 tons. About 200,000 head of cattle are also imported annually.

The significance of the imports of vegetable oils is apparent in relation to the fat supply. The total consumption of fats for food and industry in 1936 was estimated at 2·2 million tons. Of this quantity, 989,000 tons (approximately 45 per cent.) were imported, including 653,200 tons (oil content) of vegetable oils and oil-yielding materials, 170,000 tons of whale oil, and 75,400 tons of butter. Most of the vegetable oils, as already noted, are imported from the tropics, and all the whale oil from the Antarctic, so that probably three-quarters of the imports of fats are affected by the cessation of overseas trade. The proportion of the vegetable oil import used directly for human consumption is indicated approximately by the output of margarine. The total oil import, including whale oil, was 823,000 tons, against a margarine production of 422,500 tons. It is noticeable that though the imports increased

[1] Professor K. Brandt believes that the problem of protein for livestock has been solved to a considerable degree. "Instead of feeding livestock with natural plant protein from oilseeds, bran or yeast, or with animal protein like fish meal, blood meal or meat scraps, they are fed a mixture of natural products and synthetic components of proteins, like urea and amino acids. These are derived from the air in the huge 'Leuna Works,' which also produce the bulk of the nitrogen for fertilizer and gunpowder. The cows, sheep, pigs, and horses may not like this bill of fare; but in an emergency 'the devil feasts on flies' " (*Foreign Affairs*, April 1940).

[2] The effect of the cessation of German overseas trade is shown in the world export figures. Export of soya beans from Manchukuo declined from 398,000 tons (Sept.–Nov. 1938) to 100,000 tons, and ground nuts exported from India from 300,000 tons (Sept.–Dec. 1938) to 90,000 tons.

after 1936, the amount of margarine manufactured decreased, the balance going to industrial uses. This loss of fats could of course be made good to some extent by increasing the imports of butter and other animal products.

Home production has also striven to replace imports of textile fibres, among which figure cotton, 250,000 tons in 1938, somewhat less than the imports of previous years, and jute, 115,000 tons. Supplies of wool are also largely dependent on foreign sources; 125,000 tons were imported in 1938, and it is estimated that one-tenth only of the consumption is covered by home supplies. The home supply of flax fibre however has been increased recently: 29,000 tons were produced in 1938, in contrast to the 1933–37 average of 17,000 tons. This increase is reflected in a slight decline of the imports, 8,500 (av. 9100 tons). There are accessible supplies in Lithuania and Belgium. To dispense with these external sources, much attention has been given to the manufacture of staple fibre from wood pulp. This appears to be unsatisfactory, but by including it in 1938 it was claimed that 38 per cent. of textile requirements were covered by home supplies.

To maintain a high standard of agricultural production great quantities of artificial fertilizers are essential. Germany possesses extensive potash deposits, and manufactures nitrogenous fertilizers from atmospheric nitrogen; in 1938 however she imported 147,000 tons of nitrates from Chile. In that year also she obtained 1·1 million tons of mineral phosphates from the United States, French North Africa, and the U.S.S.R. Phosphatic fertilizers are produced industrially in the treatment of certain ores, but the loss of these supplies must throw a further burden upon the national economy.

Much has been written lately of the importance to German industry of her iron ore imports. It is sufficient to note here that home production in 1937 was 7·7 million tons (a 30 per cent. increase on the 1935 output), with a metal content of 2·5 million tons. Imports in that year were 20·3 million tons, an increase of 50 per cent. on those of 1935. 8·7 million tons were of Swedish origin; this ore, particularly that from Northern Lapland, has a metal content approximately twice that of other European countries. Thus the imports from Sweden represent in metal content half the total imports, and about twice the domestic production. In addition to this ore, 447,000 tons of pig iron were imported, about a quarter from Belgium. Supplies of ore exist in Czechoslovakia and Austria, from which 3·64 million tons were extracted in 1937; the metal content however was low, about 1·23 million tons.

Among the non-ferrous metals there are also considerable deficiencies, of which the most important is copper. About 30,000 tons of copper ore was produced in Germany in 1937: compared with the consumption this quantity is negligible. 547,000 tons of ore and 200,000 tons of crude copper and scrap were imported in 1937, the ore being 50 per cent. above the figure for 1935. Small quantities are produced in the U.S.S.R. and in Yugoslavia. German imports were mainly drawn from Northern Rhodesia, the Belgian Congo, and the United States. To conserve resources, the use of copper has been restricted, and aluminium substituted where possible. The supply of aluminium however is also dependent upon external sources for the bauxite and cryolite from which it is extracted. The German production is small, 18,000 tons in 1937, contrasted with an import of 1·3 million tons, almost three times

the quantity for 1935. The sole source of cryolite is south-west Greenland, but supplies of bauxite are available in Hungary, Yugoslavia, and Italy, though the total production of these countries only equalled the German imports.

A number of non-ferrous metals are important as alloys in the steel industry. The most essential, manganese, is deficient in Germany, and about 545,000 tons were imported in 1937. A quarter of this quantity was produced in Czechoslovakia, but the manganese content is low, as is that of the other small European producers.

The imports of chrome ore in 1937 were 130,000 tons. The chief European producing areas are in the south-east, Turkey, Yugoslavia, and Greece.

Other rarer metals used as alloys for special steels, such as tungsten, molybdenum, and vanadium, are produced in relatively small quantities and in scattered parts of the world. Some tungsten is obtained from Portugal, Sweden, and Finland, but in quantities which are small in comparison with the German import of 11,192 tons of ore in 1937. (British imports 8676 tons.) Molybdenum is mined in southern Norway, the average annual output being 625 tons (sulphide content). The amount of the German import is not known, but in 1937 the United Kingdom imported 4095 tons of ore. Vanadium, chiefly obtained from Peru, is also present in small quantities in German and French iron ores. The Peruvian export of concentrates in 1937 was 6520 tons. As the storage of these metals should not be difficult, the cessation of supplies would be serious over a long period only. There is one alloy however with which Germany is now well supplied, namely magnesium. The largest producer of crude magnesite in the world is Austria, where 291,494 tons were mined in 1936, more than equivalent to German imports.

Nickel is another metal for which Germany depends upon external sources. 20,000 tons of nickel ore and 3300 tons of crude and scrap nickel were imported in 1937. Supplies from Greece have been heavy from time to time, amounting to two-thirds of the total imports in 1935.

Germany is better placed with regard to lead: she produced 70,000 tons (metal content) in 1937, and imported 125,000 tons of ore and 72,000 tons of pig lead, a 25 per cent. increase on the 1935 totals. Some lead is produced in Czechoslovakia and Poland, but the chief European producers are Yugoslavia and Italy.

Tin imports, including crude and scrap, amounted to 17,000 tons.

With regard to metals therefore the position is that for tin, copper, and manganese ore Germany depends upon extra-European sources, and for iron ore largely upon Scandinavia, while various quantities of nickel, chrome ore, lead, and bauxite are available in south-east Europe.

The position of German oil supplies is roughly as follows: her total import of oil (crude petroleum, petrol, etc.) is approximately 3·3 million tons annually. Of this, 1·25 million tons is petrol. 25 per cent. of the motor spirit came from Romania, and 30 per cent. from Curaçao and other Central and South American countries. To replace these overseas supplies, apart from the production of Poland (total production about half a million tons), the sole remedy would be to increase imports from Romania and the U.S.S.R. The total output of Romania in 1937 was 5·5 million tons, so that Germany would require to take three-quarters of this to maintain her supplies. It is improbable

that significant quantities could be obtained from the U.S.S.R. Russian output, though increasing, has not reached the planned level, and petrol is of special importance to Russia owing to the mechanization of agriculture. The problem of transport also raises considerable difficulties.

In the past few years Germany has produced about half a million tons of crude petroleum annually, and about 2 million tons of oil by hydrogenation. These quantities could be increased only with considerable difficulty. The consumption of petrol has been restricted by using industrial alcohol, benzol, and heavy oils for Diesel motors. Should the rate of consumption rise therefore, Germany's oil reserves would be seriously strained.

To summarize the general position: Germany's supplies of food, particularly carbo-hydrates, are sufficient, though meat and fats are threatened through the decline of vegetable oil imports, regarded as fodder or as raw material for margarine or other fats. The yield of crops is also likely to be affected by shortage of artificial fertilizers. The cessation of imports, particularly of certain minerals, textiles, and oils used industrially, will ultimately affect the industrial output. Where these can be made good in part by substitutes, *e.g.* by oil from coal, artificial fertilizers, synthetic rubber (raw rubber imports, 1938, 96,200 tons), and staple fibre, an additional strain is thrown on industry, especially coal mining. Under this stimulus the output of coal has risen markedly; the production in 1937 was 181·6 million tons of coal and 182·1 million tons of brown coal, an increase of 28 per cent. and 24 per cent. on the production in 1935.

The occupation of Denmark will augment German food supplies in the immediate future, until the shortage of fodder and fertilizers is felt. Denmark exported 174,000 tons of bacon, 158,000 tons of butter, and over 100,000 pigs in 1938. Against this must be set heavy imports of fodder, *e.g.* 250,000 tons of soya beans and 34,000 tons of ground nuts (average 1933–37), and of fertilizers, nearly 200,000 tons of phosphate rock and 20,000 tons of superphosphates in 1937.

It should be emphasized in conclusion that where alternative and accessible sources of supply have been indicated above, it does not follow that they are available to Germany. Imports must be met by cash or barter, and Germany's purchasing power has been considerably restricted. Her pre-war policy was to export to European countries to pay for essential imports from overseas. The closing of the British, French, and other markets has thus deprived her of much purchasing power, and added to the problems raised by the actual cessation of supplies. To obtain more materials from the Balkans, for example, she must increase her export trade to those countries, or to the other markets remaining open to her. She had, it is true, a favourable trade balance with the Balkans, but to redress her position to any significant extent she must increase her imports much beyond this balance.

THE PROBLEM OF VINLAND

AMERICA'S STRANGEST STORY: here was Vinland, the Great Lakes region of America. By JAMES W. CURRAN. *Sault Ste. Marie: The Sault Daily Star*, 1939. 8½×5½ *inches;* xiv+360 *pages; illustrations and sketch-maps.* $4

THE authenticity of the Norse voyages to America has long been accepted by serious students, but no agreement has been reached as to the exact location of the various places mentioned in the Sagas. Indeed the nature of the documents makes precise identification difficult, if not impossible. As a result the Norse discoveries have been located over a wide stretch of the east coast of North America from Florida to Baffin Island, and it has been generally recognized that until authenticated Norse remains had been found it was impossible to do more than make intelligent guesses.

The exaggerated claims of C. C. Rafn, in 1837, and the subsequent credulity of many others,[1] led to a general scepticism in the matter of "remains." Ruins at Newport, Rhode Island, and Charles river, Mass., the Dighton Rock and the Yarmouth Stone, all claimed as authentic, turned out, on examination, to be otherwise. In 1898 a farmer in Minnesota discovered a large stone, now known as the Kensington Stone, on which was an inscription in runic characters. It bore a date of 1362 and purported to describe the adventures of thirty men "on an exploration journey from Vinland." This stone was examined very carefully and pronounced a forgery.

In a recent work Mr. H. R. Holand reviewed all the evidence about the Kensington stone, and, in the opinion of those who have long been recognized as experts in this question, he had at the least "made out a case for a complete new hearing." Some would go further and maintain that "arguments for the authenticity of the inscription are well supported." [2] There is therefore a good case to be made for the presence of Norsemen in Minnesota in 1362. They may have been members of the expedition sent by King Magnus Ericsson to Greenland in 1354. There is reason to suppose that many colonists had deserted Greenland a few years earlier, and it is not unreasonable to guess that the leader of this expedition, Paul Knutson, followed the deserters to North America.

The presence of Norsemen in this part of the continent is attested by other "remains" scattered over the country between the Red river valley in the west and Sodus Bay, Lake Ontario, in the east. How many of these are of undoubted Norse origin it is impossible to say, but there is good reason to accept the latest find as such. This discovery was made by Mr. J. E. Dodd in 1930, although it was not generally known for some years afterwards. While prospecting for gold near Beardmore, Ontario, Mr. Dodd unearthed a Norse sword, an axe, and part of a shield. The sword is said to date from about the year A.D. 900. The relics have been submitted to experts who have pronounced them to be genuine, and they are now in the Royal Ontario Museum.[3] In a recent note on the question Mr C. T. Currelly, Director of the Museum, accepts them as genuine and suggests that the fact that they form a set and were found together rules out the possibility of their carriage to Beardmore by Indians.[4]

The acceptance of the Kensington stone as genuine, and the finding of other

[1] See for example J. Toulmin Smith, 'The discovery of America by the Northmen,' London, 1839.

[2] See *Geogr. J.* 59 (1932) 437; *Geogr. Rev.* 22 (1932) 508; and particularly *Antiquity* 6 (1932) 420.

[3] *Geogr. J.* 91 (1938) 395–6; 94 (1939) 349.

[4] *Canadian Historical Review* 20 (1934) 4.

relics, necessarily calls for some revision of the Norse discovery of America. It is to this task that Mr. J. W. Curran has devoted himself. His book opens with two preliminary chapters explaining how he came to write it and setting out the Norse case as he sees it. Twenty "documents" follow. These are not documents in the ordinary sense but accounts of alleged relics of the Norsemen, discussions of the identification of places, excursions into archaeology, anthropology, philology, and other miscellaneous matters. In Part II of the book there are twenty-six "original articles" reprinted, with some changes, from the *Sault Daily Star*, of which Mr. Curran is editor, and written between August 1938 and February 1939. An appendix, consisting of additional notes on many of the topics already discussed, a short bibliography, and three sketch-maps complete the book. This arrangement leads necessarily to much repetition and to some contradiction. The author also drags in many matters not strictly relevant to the story and commits himself to some statements of questionable validity. But he is quite frank about his position. Both he and his readers in Sault Ste. Marie are "full of credulity" and will "swallow a story and not wait for somebody to warn us it isn't true." The book is journalism open and unashamed. Its defects however must not be allowed to prejudice the reader against the case which Mr. Curran brings forward. He has a connected story to tell. The Norsemen entered the New World through "Ginnungagap," which was Hudson Strait; Helluland was "around or near Hudson Strait"; Markland was the wooded shores of Hudson and James bays; Vinland was "the great lakes areas of inland America." The identification of these lands depends upon three different kinds of evidence. The geographical features, vegetation, birds, and relationship to the Greenland colony all fit the descriptive passages in the Sagas better than do those of any localities on the east coast. There are abundant and genuine remains of the Norsemen here. The Cree Indians invented a name for Europeans, "the wooden-boat men," long before the French arrived on the continent and must have seen the wooden ships of the Norsemen.

Contact with this Norse settlement in the heart of North America was more or less continuous, for migrants from Greenland went there and scattered their relics widely during the Middle Ages, and possibly the Norsemen continued their trade up to a century before the arrival of the English and French on Hudson Bay. These Norsemen intermarried with the Indians and affected the type so much that their features can still be recognized. Many writers have noted the superiority of culture of the Mandans among whom Verendrye, in 1738–99, found "dolmens" supposed to be modelled on a Scandinavian type. Mr. Curran claims that he recognized "Norwegian Legs" in a Cree Indian. It is the kind of "evidence" that naturally leads to suspicion of the whole case which the author is making. In the presence of facts such fanciful speculations are unnecessary.

Discounting the exaggerations of an enthusiast and remembering that Mr. Curran admits to "a presumptuous suggestion from an amateur," one must nevertheless pay serious attention to this reconstruction of the Norse voyages, involving a revolutionary change in the accepted route of the Norsemen from Greenland to the continent, and a recognition of their presence in North America for a very long, and perhaps a continuous, period. On both these points some light has already been thrown by the anthropological researches of J. Löwenthal,[1] who traced Scandinavian influences from south Sweden through Iceland, Greenland, and Hudson Strait to Nelson river, Red river, and Lake

[1] Quoted by Professor R. Hennig in "Normannen des 11 Jahrhunderts in der Hudsonbai und an den Grossen Seen," *Petermanns Mitt.* 85 (1939) 58.

Superior. Through the Crees, as intermediaries, these influences penetrated to the Potawatomi, who lived on the western shores of Lake Huron, and the Ottawa, whose homes were round Georgian Bay. Thence through the Iroquois they reached the Atlantic coast.

Mr. Curran is anxious to secure further evidences of the Norse visits to America and ends his Appendix by offering a copy of his book "for a Norse relic, or possibly for a look at one." This is hardly the best way to encourage scientific research and may lead to the same "finding" of relics as discredited the workers of a century ago. Something more than an abundance of credulity is still necessary. But he has done a useful service in bringing vividly before us the possibilities of an entirely new conception of the Norse voyages to America, and his claim that he has located Vinland certainly puts the onus of proof on those who are disposed to doubt it. J. N. L. BAKER.

REVIEWS

EUROPE

BAUSTEINE ZU EINEM SYSTEM DER TEKTOGENESE. By FRANZ ED. SUESS. II. Zum Bewegungsbilde des älteren Mitteleuropa; hypokinematische Regionalmetamorphose. Pp. 88–238. (Fortschritte der Geologie und Palaeontologie. Edited by W. SOERGEL. Band XIII. Heft 43.) *Berlin: Borntraeger*, 1938. 10×6½ *inches; map and profile. M.*15

In this series of essays Professor Suess discusses certain generalizations about the deformation of the earth's crust. He is particularly interested in the relation between different kinds of rock metamorphism and different styles of structure. In the first essay he set out his ideas in general terms; in this second one he applies them to a particular case, namely the broad zone of Central Europe in which the crust was intensely deformed towards the close of the Palaeozoic era.

Much of this deformed zone is now covered up by later rocks. Professor Suess first shows how the structures and metamorphism in the various remnants can be fitted into a single structural plan. There is a broad northern zone where the rocks are folded and thrust but remain relatively unmetamorphosed. This zone is represented in the older rocks of Devon and Cornwall, most of Brittany, the Ardennes and the Rhenish mountains, and the Harz. Then there is a narrow zone of metamorphic nappe-structures; this zone is recognized in the Erzgebirge and part of the Odenwald. South of it is another broad zone, parts of which are seen in Bohemia, the western part of the Odenwald, the Schwarzwald, the Vosges, the Alps, the French Central Plateau, and the southern part of Brittany; this is the zone of intrusion-tectonics and periplutonic regional metamorphism.

This whole worn-down mountain system is compared with the more recently formed Alpine system. Both have the same broad plan: the narrow middle zone of the older system is compared with the Pennine nappe zone of the Alps, and the southern zone with the East Alpine nappes. According to Suess the structures in these and other mountain ranges are formed when one continental mass of the crust drifts against another. When this happens, one of them will be driven over the other; in the late Palaeozoic structures of Central Europe, the northern zone represents the crumpled-up margin of one mass; the middle zone is supposed to be the material pinched in between the two masses, while the southern

zone, with intrusion-tectonics, is taken for the overriding front of the second mass.

Much of the author's own detailed work has been done in Bohemia and it is there that he finds the most convincing evidence to support his interpretation. If however the interpretation is correct it must also apply elsewhere, and one of the most interesting parts of the essay is the attempt to show that the interpretation clarifies and correlates some of the structural features of Brittany. Here the evidence seems to be strained to fit the theory. English geologists unfamiliar with the structural intricacies of Central Europe will perhaps reserve judgment until they see how Suess applies his ideas to the Caledonian structures of north-west Europe.

In the course of the essay, many commonly accepted ideas are critically discussed. The conception of the orogenic cycle, in which geosynclinal sedimentation is followed by orogenesis and the two are causally related, gets little support from a study of the Variscan orogeny of Central Europe. The separation of the structural evolution of a mountain system into a series of distinct phases, an idea particularly elaborated by Stille, is strongly criticized. In his opinion that regional metamorphism is not due to orogenic deformation, the author is on common ground with Read [Pres. Address to Section C, British Association, 1939]. Many will agree with his objections to the idea that parts of the crust can become stiffened by metamorphism and folding. He also criticizes the related idea that the continental masses have grown by the welding on of marginal fold mountains.

The whole volume is marked by a speculative boldness of thought and a critical attitude to many current ideas. As yet geologists do not agree on the most fundamental questions—whether the continents and oceans are permanent features of the earth's surface, whether continents have drifted, or how mountain ranges came to be formed. One of the most promising lines of attack on these problems is through the accurate understanding of structures in mountain ranges. This is what Professor Suess is trying to reach, and why his essays are important for those who are interested in the origin of the major features of the earth's surface. R. M. S.

THE ARCHAEOLOGY OF THE CHANNEL ISLANDS. Vol. 2: The Bailiwick of Jersey. By JACQUETTA HAWKES. *Jersey: Société Jersiaise*, 1939. 10 × 7½ *inches;* xviii + 320 *pages; illustrations, maps, and figures.* 25*s*

The first volume of 'The archaeology of the Channel Islands' described the Bailiwick of Guernsey and was published some years ago. The second volume is by Mrs. Jacquetta Hawkes, who acknowledges her indebtedness to Mr. T. D. Kendrick, the author of the first one and collector of much material towards the publication of the second. But the bulk of the latter book is the work of Mrs. Hawkes. She mentions however that her account is to a large extent "a summary of the past work of the Société Jersiaise," which has flourished now for nearly seventy years.

For the geographer, who studies the past history of man in relation to his geographical environment, there is much of value in this volume. "During pleistocene times certainly, and post-pleistocene probably," Jersey was a part of the mainland of France, and, in this respect, it differs from Guernsey, which was not occupied, so far as is known, by humanity during the Palaeolithic Age. In Jersey, apart from the existence of four flint hand-axes of uncertain provenance, which are of early Palaeolithic date, the earliest relics of humanity were found in the cave dwelling of La Cotte de St. Brelade, in a cliff in the south shore of the island. Here there were discovered, in 1910–11, thirteen human teeth in a good

state of preservation, and "this is the only certain find of pre-neolithic human remains to have been made in the island." The teeth belonged to a man, possibly from twenty to thirty years old, of the Neanderthal type. The contemporary fauna, of which remains were discovered in the cave, included the cold-climate mammoth, woolly rhinoceros, and reindeer.

There appears to be no very early Neolithic culture. Mrs. Hawkes shares the opinion of Dr. Marett and the late Mr. Joseph Sinel, that during the late Neolithic period Jersey was still attached to France, though the advance of the sea may have already begun. "Tentatively . . . it may be put forward that Jersey became isolated somewhere about the middle of the Armorican Bronze age or rather later."

But, for most of us, by far the most interesting prehistoric period in Jersey is the Megalithic, which is magnificently represented by the Hougue Bie, and other smaller, though important tombs, such as La Pouquelaye de Faldouet, the passage grave of Mont Ubé, and others. The Hougue Bie, which is some 2 miles north-east of St. Helier, is so much the most imposing of these ancient burial places that a few words of description may be permitted. It belongs to the type of tomb having a chamber approached by a long, narrow passage, "the whole built and roofed with large unhewn stone blocks," the interstices being filled with dry stone packing. The structure is covered by a mound. Mrs. Hawkes remarks that it bears a close resemblance to Maeshowe in Orkney, although there was no direct connection between these far separated tombs. The Hougue Bie has some likeness also to the tomb of New Grange in County Meath.

The writer says, "La Hougue Bie is justly famed beyond any other prehistoric monument in Jersey. . . . Indeed, it may well claim to be one of the finest memorials of its time surviving in Western Europe." Externally it appears as a great circular mound, with two small medieval chapels on the top of it. The mound has a diameter of 180 feet and a present-day height of 40 feet. The main chamber of the tomb is directly beneath the summit of the mound, and is approached by a passage formed of uprights and capstones of granite; the total length of chamber and passage being 67 feet. The axis is oriented east and west. It was excavated by the Société Jersiaise in 1924. Before then the existence of the passage and chamber grave were quite unknown. Mrs. Hawkes gives a full account of the excavation and of the finds, which included vase-supports, beaker sherds, and a few fragmentary remains of eight human beings, two or three being women. The monument, now the property of the Société, is being very well looked after.

As to the date of the Megalithic Period in Jersey, Mrs. Hawkes remarks that this is an expression which covers "the phase during which large stone monuments were being constructed by people broadly speaking in a neolithic state of culture, although not totally ignorant of the use of metal," the central date for the period being sometime about 2000 B.C.

The book deals in a thoroughly scientific fashion with the whole array of the prehistoric antiquities of Jersey, and is a mine of exact information about stone and metal implements, pottery, habitation sites, tombs, menhirs, and all the many relics of the distant past, fortunately preserved for our study and the increase of our knowledge of the prehistory of Western Europe. C. F. A.-C.

LE MONT-BLANC: route classique et voies nouvelles. By CLAIRE-ELIANE ENGEL. *Neuchâtel and Paris: Victor Attinger*, [1939]. 8 × 5 *inches; 162 pages; illustrations. 32fr.*

This small book, summarizing a history of over 150 years, gives in brief the gradual development of exploration from the earliest attempts, crowned with

success in 1786, to the most modern variations on the great routes from the Italian side. In the heyday of Alpine pioneering the southern faces were rarely touched even by the most adventurous mountaineers; nowadays, Courmayeur at the foot of the peak has become a Mecca for the bolder spirits who seek adventure in the upper fastnesses of Mont Blanc, while Chamonix, which once echoed to the cannon's greeting of heroes returned from the summit, serves rather as a centre whence to visit the formidable satellites of ice and rock which are grouped about the throne of Mont Blanc. In telling the story, Mlle Engel has wisely kept her gaze steadfastly upon the supreme mountain and refuses to be led up side valleys. Hence there is in this book a continuity of history and adventure without undue detail, and the admirable choice of illustrations, from early portraits and drawings to modern vignettes of the upper crags, guide the reader clearly as the story passes from Chamonix to Courmayeur, from Brenva to Brouillard. An excellent bibliography completes this brief summary of many great episodes in Alpine history. H. E. G. T.

GALLEGAN PROVINCES OF SPAIN: Pontevedra and La Coruña. By RUTH MATILDA ANDERSON. (Hispanic notes and monographs. Travel series.) *New York: Hispanic Soc. of America*, 1939. 9×6½ *inches;* xviii+496 *pages; illustrations and end-paper maps*

This first volume in the Travel Series of the well-known collection "Hispanic notes and monographs" should for a long time be a standard work of reference for all who plan a visit to the two provinces of Spain's far north-west. The author spent four months in western Galicia, in company with her father and an excellent camera, which illustrates, often with quite uncanny exactness, almost every page of her book. Her only serious faults are an excessive discursiveness and prolixity: the trivial tourist happenings recounted in tedious detail, the enumeration of the items of the most ordinary meals, the descriptions of Spanish customs with which every one who has ever been to Spain is familiar, are all redolent of the letter home. But these are defects of the qualities which give the book its chief value: the combination of enthusiasm with knowledge and an eye for detail which, if it notes much that might be omitted, misses nothing that can give such a tour as this abiding value. Descriptions of rural customs and costumes, local legends, agricultural labour, and the routine of the characteristic activities and industries of the two provinces are of such interest that they may even in time give the book an historic value. There is indeed only one subject upon which the reviewer would have welcomed, and the reader might well have expected, fuller information: the Galician movement for regional autonomy. This must have been a highly topical subject when the author was making her tour, and that she was not unaware of its existence is shown here and there (*e.g.* p. 15). But something more might have been said of its progress under the Second Republic; for, though she would have heard more of it had her travels taken her as far as Orense, where it had its headquarters, it was also at that time a burning subject both at La Coruña and Vigo.

The book has an attractive and ably drawn historical background, and there are many pages which recall Galicia's numerous contributions to Spanish literature, though these tend to be expository rather than critical. From Juan Ruiz to Pardo Bazán and Valle-Inclán all the most important of the relevant names figure in these pages. The author's translations from verse are generally better than those from prose: the former, from poems apparently chosen for their simple beauty, are admirable; the latter are apt to be over-literal and not always clear.

There is an excellent select bibliography, including both general and special-

ized titles, from which little of importance seems to have been omitted. Alvaro de las Casas' 'Dos días en Orense' (Madrid, C.I.A.P., 1938) is relevant in parts to the western provinces, and the Rivadeneyra guide to Vigo, Santiago, and Mondariz has some useful material. On the Pilgrim Route to Santiago, which is shown on the excellent end-paper map, Mabille de Poncheville's 'Le Chemin de Saint Jacques' (Paris, 1930) is one of the most readable of recent monographs. E. A. P.

ASIA

REVEALING INDIA'S PAST: a co-operative record of archaeological conservation and exploration in India and beyond. Edited by Sir JOHN CUMMING. *London: The India Society*, 1939. $8\frac{1}{2} \times 6\frac{1}{2}$ *inches;* xx+374+xxxiii (*plates*) *pages; illustrations and map.* 25*s*

The need of a concise and authoritative account of the results hitherto achieved by the Archaeological Survey of India has long been felt: the information is buried in a mass of monographs and departmental reports published during the past three-fourths of a century, many of which are now very rare or else difficult to obtain. This want has been admirably supplied in this volume in a series of chapters dealing with the different branches of the Survey's activities (conservation, excavation and exploration, epigraphy, museums and publications), each section being written by an expert with personal experience of the subject. The story of the Department is told by the distinguished archaeologist, Sir J. Marshall, who for so many years administered it as reorganized under the keen personal direction of Lord Curzon. The early years of pioneer work by Sir Alexander Cunningham and others are treated briefly, the period from 1902, when Sir J. Marshall assumed the duties of Director-General, to 1938 being dealt with in fuller detail. Among the sections of special interest may be mentioned those by Sir A. Stein on his explorations in Central Asia and by Dr. J. Ph. Vogel on the North-West Frontier and Hellenic civilization, and that on prehistoric and protohistoric civilization by the late Mr. N. G. Majumdar, whose dastardly murder on the Sind frontier in 1938 has deprived the Department of one of its most promising officers. The sections on science and conservation and on inferences from chemical analysis by Mr. M. Sana Ullah, on Buddhist monuments by the late Mr. D. R. Sahni, on inscriptions by Mr. D. R. Bhandarkar and Mr. Zafar Hasan, and on museums by Mr. H. Hargreaves are also instructive. A separate chapter is devoted to the work that has been done in the great Indian States in which special archaeological departments have been established from time to time—the Nizam's Dominions (1914), Mysore (1890), Baroda (1934), Kashmir (1912), Gwalior (1913), Travancore (1896–97), etc. Burma, now administered separately from India, is dealt with by Mr. C. Duroiselle, whose long and intimate association with the work in that country specially fits him for the task. Lastly a chapter is added containing information intended for the guidance of tourists.

A fairly full bibliography, a short glossary of vernacular terms, a good index, three maps, and thirty-three clear plates showing, besides a few portraits, selected sites, monuments, and sculpture complete this excellent publication, which reflects credit upon the India Society for sponsoring its production and upon Sir J. Cumming for the discretion and skill with which he has coordinated and edited the material supplied by twenty-two contributors. In the words of M. Alfred Foucher, in his appreciative and discerning foreword, this volume should become indispensable to every Indianist and every scholarly Indian, as well as to occasional visitors to India who have any taste for history and feeling for art C. E. A. W. O.

KNIFE AND LIFE IN INDIA: the story of a surgical missionary at Neyyoor, Travancore. By T. H. SOMERVELL. *London: Hodder and Stoughton*, 1940. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 272 *pages; illustrations and sketch-map.* 10*s* 6*d*

Dr. Somervell is well known to explorers and mountaineers as the doctor who accompanied the first two Everest expeditions. His previous book, 'After Everest,' tells how he heard the call to offer India "the two priceless gifts of surgery and Christ." For sixteen years he has been fighting the diseases that ravage the under-nourished peasantry of the fertile, lovely country of Travancore in southern India. With no less zeal and devotion he has waged war on superstition, caste prejudice, and quackery, not in a spirit of arrogance and superiority, but with sympathy, patience, and humility. European specialists will read with awe of the number of major operations daily performed in the Neyyoor Mission Hospital; hospital subscribers with envy of the relatively trifling cost of buildings and maintenance in a country where the climate is uniformly mild and where the patient's food is normally provided, cooked, and served by his own family. Many will hear with delight of the cool, hospitable, pillared House of Prayer, unlocked, unwalled, where Hindu, Moslem, and Christian can worship quietly by day or night. Dr. Somervell ends his book with a passionate appeal to all Christian denominations to unite in putting into practice Christian precept. E. O. L.

ESCAPE WITH ME: an oriental sketch-book. By OSBERT SITWELL. *London: Macmillan and Co.*, 1940. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xvi+340 *pages; illustrations.* 12*s* 6*d*

This volume deals almost entirely with two of the most enchanting places of the East, Angkor and Peiping. In the winter of 1932 the reviewer, starting from Bangkok, made an almost identical tour. First to Angkor, then to Nhatrang and along the Mandarin Road to Tourane, Huĕ, and Hanoï; thence to Hong Kong and Shanghai, and finally to Peiping. He has visited Angkor several times, but unfortunately he was not able to stay so long in Peiping as Mr. Sitwell, and during his visit in January the cold was so intense as to make sight-seeing the reverse of a pleasure.

It is a matter for congratulation that Mr. Sitwell should have given himself the task of introducing Angkor to the general public in England, for this book will be widely read and appreciated; and for those who spend their lives in trying to spread a knowledge and a love of Far Eastern art, his collaboration and aid is doubly welcome. His treatment of Angkor has been very wise. He has made no attempt to deal with it in detail, but rather to conjure up a picture of its setting and of the majesty of the buildings which go to make up the whole. The reviewer has often essayed a description of Angkor, but has never felt able to begin, for there is not only the great Temple of Suriyavarman II (A.D. 1110–1160) to consider, but a whole city, about 2 miles square, containing the Central Temple of the Bayon and many other remains, and, in addition to these, numberless other temples in the vicinity, like P'ra Khan, Ta Prohm, and Banteai Kdei, not to mention the exquisite temple at Banteai Srei, some 15 miles away. Mr. Sitwell, coming with apparently no intimate knowedge of the history or the land of the ancient Khmer, has performed no mean feat in bringing those stones and buildings of the past to life in such an understanding manner.

There is another and most interesting point that Mr. Sitwell makes, with which the reviewer is in entire agreement. He says, in comparing the Forbidden City in Peiping with Angkor: "The European is the art of mass and contrast, Chinese that of harmony and balance. Angkor for instance, so eastern in its placing and decoration, yet depends for the achieving of its magnificence upon

contrast more than harmony, and it is for this reason that I have so insisted throughout these pages concerning it upon its European aspect; the details are Oriental, while the structure is western" (pp. 281–282). The reviewer, in searching for a parallel to Khmer art and architecture, has always felt that there is a strong affinity between it and later Norman art, which is at some periods contemporary, curiously enough, not only in the massive magnificence of the structures and the richness of the decorative carving, but even in the details themselves. This affinity can only be explained by the fact that Khmer art, although developed locally along its own particular striking lines, owes its origin to Northern Indian art, which was Aryan in essence. Moreover the present writer has a strong feeling that the origins of Norman and Gothic art will ultimately be traced to India. Thus, if this theory be true, the two had a common origin. China, on the other hand, as far as architecture is concerned, owes nothing to India, and this is why it is interesting, in these modern times, to study for instance the temples of Bangkok, where China and India meet.

The author's account of Peiping is fascinating and he has obviously drunk deep of the spirit of the place. The reviewer had no time to study the ways and customs, trades and street cries of the people, which the author has described so graphically, nor, except for one brief and disappointing visit, did he have the opportunity of wandering through the Forbidden City. Mr. Sitwell laments the want of attention given to the Altar of Heaven in the park of the Temple of Heaven. He says: "The Altar of Heaven, which, apart from its long history and the symbolism of the ceremonies for which it was built, is one of the chief objects of beauty in the whole of the Orient, will disappear within the space of a few years. Its very simplicity, the nakedness under the sky of this triple-terraced circular platform, with its wonderful carved balustrade of white marble, renders it, if continually and consistently neglected, all the more liable to disaster." In this simple, beautiful altar the Chinese genius has expressed itself to the highest degree, and "the world would certainly be the poorer for its loss." R. LE M.

ROUTENAUFNAHMEN IN WEST-SZETCHWAN. Die Sifangebirge im chinesisch-tibetischen Grenzgebiet nach den topographischen Ergebnissen der Stötznerschen Expedition 1914. By OTTO OESTERHELT. (Petermanns Mitt. Ergänzungsh. Nr. 235.) *Gotha: Justus Perthes*, 1938. 11×7½ *inches; 156+42 pages; illustrations and maps. M.18*

The outbreak of war in 1914 obliged Walther Stötzner to give up his expedition to the mountainous regions of Szechwan while the expedition was still in the field. The members became separated and it was not until 1924 that the leader was able to publish his account in the book 'Ins unerforschte Tibet' (Leipzig). Professor Oesterhelt, the surveyor to the party, decided to publish his results in the form of a detailed discussion of all the factors arising in the execution of a route traverse. The present publication has a foreword by Dr. Sven Hedin which states: "The route traverse is not merely the classic survey technique of the explorer of the past—it remains even in the era of the motor-car, aeroplane, and photogrammetry the indispensable exploratory method."

Two new instruments have become available to travellers since the time of Professor Oesterhelt's journey: the wireless set and the range-finder. The former has replaced the chronometer and the latter, to judge by Mr. Kaulback's results, is of the greatest value in competent hands. Nevertheless the present thorough investigation is still both interesting and important; the chapters on the barometric measurement of altitude and on the influence of slope on the rate of marching are outstanding.

There are in addition a few pages of general geographical information about the district which, according to Sven Hedin, has not been the subject of any close investigation since Stötzner's expedition. M. A. S.

GEOGRAPHY OF THE SOILS OF CHINA. By JAMES THORP. (National Geological Survey of China.) *Peking: Ministry of Industries*, 1939. 9×6 *inches;* xviii+552 *pages; illustrations, folding-map, and diagrams.* 16*s*

The author of this important work was given three years' leave from the United States Bureau of Chemistry and Soils to enable him to become chief soil technologist of the National Geological Survey of China and to organize a staff and carry out a regional survey of the soils of the country. The author's preface is dated July 1936 and the present book was first published by the Geological Survey at Nanking in that year. According to the title page the issue under review has been "reprinted by the Ministry of Industries, Peking, 1939." It is an interesting commentary on the strenuous efforts being made to maintain the output of scientific work in China that such a book should emanate from Peiping in 1939, but perhaps to the difficulties of the circumstances must be ascribed the unfortunate fact that practically all the plates are meaningless smudges, whereas those in the original issue were reasonably good. The folding-map, on the other hand, is well produced with the soil types shown by overprinting in blue symbols. In black and white the same map is familiar in J. L. Buck's 'Atlas of land utilization in China.'

At the International Soil Congress held at Oxford a few years ago, it was suggested that China with its unique type of monsoon climate might well prove to have soils unlike those in any other part of the world and that the study of Chinese soils had best proceed by descriptions entirely *de novo*. Thorp finds however that the range of soils is just that which might be expected in any part of the world with a comparable range of latitude, rainfall, and temperature. He makes a fundamental division into pedocals and pedalphers (with other leached soils). The former are the soils of the cooler and drier regions, with a level (normally the B-horizon) of calcium carbonate accumulation. The familiar chernozems, chestnut earths, grey desert soils and alkali soils are present. Amongst the pedalphers five groups are distinguished—podzols, slightly podzolic soils (brown forest earths), red soils, yellow soils, and soils of recent alluvial origin. The "red soils" are those of the hot wet south and south-east, and are divided into "old red earths, slightly to moderately podzolized," and "podzolized old and young red earths." In this way the "laterite" bogey is avoided, the term "laterite" being rightly restricted to Buchanan's original Indian type. The descriptions of the red soils are particularly valuable as they break new ground, and the whole classification adopted by Thorp has the great advantage that it permits direct comparison with the soils of the United States as described in the 'Atlas of American agriculture.' L. D. S.

AFRICA

L'AFRIQUE BLANCHE. By E.-F. GAUTIER. (Géographie pour tous.) *Paris: Arthème Fayard*, 1939. 9×5½ *inches;* 366 *pages; illustrations and maps.* 35 *fr.*

L'AFRIQUE DU NORD FRANÇAISE DANS L'HISTOIRE. By E. ALBERTINI, G. MARÇAIS, G. YVER. Introduction géographique de R. LESPÈS; illustration de ROGER J-IRRIÉRA. *Lyon and Paris: Editions Archat*, 1937. 11½×9 *inches;* 334 *pages; illustrations and sketch-maps.* 20*s*

Ever since Napoleon landed in Egypt with a large band of scholars France has remained no less intellectually than politically interested in Africa. As a result

there has flowed from the French presses a stream of well-grounded studies, such as the two noted above, on the geography, archaeology, and history of North Africa. Although these two works differ in size and format, and although the larger cooperative work is mainly historical and the smaller is mainly geographical, they are alike designed as relatively popular expositions of their subjects. No trouble seems to have been spared in providing illustrations, and for the serious student there are references to the monographs on which these works are based. The authors are experts than whom none could be better fitted to write these wide surveys.

Some readers will find provocative the title of Gautier's book, for he is entirely unconcerned with that large part of south and east Africa where some two million whites exercise political control. His "White Africa" lies solely in the north, and consists of the elongated tract flanked southwards by the Sahara and northwards or eastwards by the Mediterranean and Red Seas. Gautier has no difficulty in showing how little, except in the Sudan and Abyssinia, this area was historically related to negroid Africa, and how distinctly—in race, language, agricultural practices, and political associations—it preserved a geographical personality of its own. Gautier's book offers us a geography firmly based on geology and history, yet related closely to the problems of to-day. His many maps, geological sections, and physiographic diagrams help the reader at every turn, and at a time when interest is focused on the Mediterranean and the Near East, it is particularly convenient to have reduced to the content of a moderate-sized book a geographical account of French North Africa, Italian Libya, Egypt, the Anglo-Egyptian Sudan, and Abyssinia.

The cooperative work is concerned with "North Africa," as the French understand the term: Algeria and the protectorates of Tunisia and Morocco. The book is in three parts. The first, by Albertini, outlines the prehistoric, Roman, and Byzantine phases; the second and longest by Marçais describes the successive Moslem phases, Arab, Hilalian, and Turkish; whilst the third and shortest, by Yver, discusses the French phase. These are preceded by a short geographical introduction by R. Lespès, and are illustrated throughout by the drawings of Roger J-Irriéra. This cooperative work is primarily a summary of political history, but geographers can find much of interest, especially in the first and third sections, on such topics as colonization, settlement, and economic development. It is a pity that it was thought desirable to popularize the maps so that they serve only to locate places, when it was possible on the basis of the considerable available research to present composite maps and distributions for certain past phases. W. G. E.

PALEOLITHIC MAN AND THE NILE VALLEY IN LOWER EGYPT, with some notes upon a part of the Red Sea Littoral. A study of the regions during Pliocene and Pleistocene times. By K. S. SANDFORD and W. J. ARKELL. (Oriental Institute Publications, vol. XLVI. Prehistoric survey of Egypt and Western Asia, vol. IV.) *Chicago: University of Chicago Press*, 1939. 12×9 *inches;* xix+106 *pages; illustrations and maps.* 48*s*

This is the final volume of four dealing with Palaeolithic man in Nubia and Egypt, and like its precursors it throws a flood of much-needed light on the early history of the Nile and its valley. Four important steps forward have been taken, and a general theory of the Nile terraces roughed out into which lesser investigators may fit their details. Drs. Sandford and Arkell deserved a find of skeletal material, but this has again been denied them; and in this book their diligent classification of the gravels and associated implements is continued into lands bordering on the Delta, and part of the Red Sea coast.

Publication of results shortly after they come in has committed the authors to dealing with each geological period in turn by making appropriate selections from their obviously very full field note-books. This involves much re-examination of important localities, and, to ascertain the authors' attitude to any major problem, it becomes necessary to assemble statements from all over the book. The method may be due to a wish to avoid special pleading, for they are always cautious and dispassionate, and the various aspects of any question are fairly stated.

There are still puzzles to be solved. Thus an intriguing set of high-level igneous gravels was met with well above the 200-metre contour on Gebel Khashab behind the Pyramids. These are regarded as deposited by the Plio-Pleistocene Nile, and, as their altitudes exceed that of any terrace known to the south, "there is probably a local explanation for them."

In the Clysmic (why "clysmic"?) area, that is the Greater Gulf of Suez, the authors are sure to meet with the opposition that all pioneers should expect. For they reject Mr. H. J. L. Beadnell's suggested identification of the 55-metre Red Sea terrace with the Mediterranean Milazzian, and go so far as to say on p. 61 that "connection between the Mediterranean and the Gulf of Suez had been broken in Upper Miocene times." This view is of course discordant with that put forward in 1916 by Dr. W. F. Hume ('Report on the oilfields of Egypt,' p. 21). But the authors accept Mr. L. R. Cox's complete separation of the Red Sea malacological fauna from that of the Mediterranean throughout the periods involved (*Proc. malacol. Soc., Lond.*, xviii, pp. 185–7). His view supposes that the few (but abundant) forms common to both seas such as *Ostrea crassissima* and *O. cucullata* are descendants from the Miocene Mediterranean. Moreover, to support it, great, if temporary, damage has to be done to the landscape. The authors say quite definitely on p. 37: "Mediterranean Pliocene sediments may be traced to Gebel Shubra Wit and the Red Sea Pliocene fossils to the Great Bitter Lake." A gap of only about 10 miles in distance separates them, and "there seems no escape from the conclusion that an effective but very narrow barrier separated the two seas in Pliocene times," and again on p. 94: "Post-Miocene deformation caused, presumably by Upper Pliocene times, a barrier more than 200 metres high to arise between the Mediterranean and the Gulf of Suez." This was "situated over part of the present site of the Great Bitter Lake and Gebel Gunaifah."

At an earlier stage, in the Mio-Pliocene, the authors themselves do not want this barrier, for on p. 18 they presume that the bone-beds of the Wadi Natrun are an outcrop of the Pontic Nile's deltaic deposit, while they regard the fresh-water fauna unearthed at Shallufa during the cutting of the Suez Canal as possibly the same beds. That is to say the Pontic Nile may have discharged both into the Red Sea and the Mediterranean. And later on in the Plio-Pleistocene the barrier vanishes and is replaced by a more credible Nilotic delta (p. 62) which kept the two seas apart till it was swept away by "denudation on a vast scale by torrents passing off Gebel Atakah." Some corroboration of this later deltaic deposit is afforded by the presence of igneous pebbles at the 85-metre level south-east of Gebel Geneifa where the reviewer noted them in 1937. He is still inclined to the hitherto orthodox view that in the early Pliocene the two seas may have been in contact and that in the case of the "barrier caused by deformation" the authors may have "given to airy nothing a local habitation and a name." Be that as it may, to have read the book has been a liberal education for one of the conservatives on the spot, and the gravel banks on both sides of the Nile Delta will never be quite so dull again. Even specialists in the long run have to be judged by their generalizations, and sufficient of Drs. Sandford and

Arkell's will stand to cause them to be regarded for a long time to come as the authorities on their subject. G. W. M.

INDEPENDENT EGYPT. By AMINE YOUSSEF BEY. *London: John Murray*, 1940. 9×5½ *inches;* xxiv+272 *pages; illustrations.* 15*s*

This is a frank and rather remarkable book, written in faultless English, which deserves to command attention, and should be read by all interested in modern Egypt. Its author reveals himself not only as an ardent nationalist but as a patriot in the best sense of the word. Though associated with the Egyptian Nationalist movement since its inception and a devoted adherent of the late Saad Pasha Zaghlul, he discusses the Egyptian problem in a dispassionate and sensible manner, and shows that he is by no means blind to the shortcomings of his compatriots and their political leaders. He is for instance fully aware how the Egyptian Nationalist cause has suffered through intrigues and personal considerations. Again, he obviously holds the British and their institutions in high esteem and appreciates the benefits which they have conferred on Egypt, though he is also alive to the fact that British policy in Egypt has been at times mistaken and inconsistent, and he does not hesitate to criticise. One may not agree with all his criticisms, but one feels that they are made in good faith, and that many of them are justified.

Amine Bey Youssef has not devoted himself entirely to politics. He has striven to stimulate Egyptian trade and to improve the lot of the poorer elements among his fellow countrymen in a variety of ways, more especially by the founding of a successful cooperative organization for their benefit. He undoubtedly deserves well of his compatriots, and he also deserves the gratitude of the British element, for he has striven for many years to improve Anglo-Egyptian relations.

E. G. S.-H.

ONCE IN SINAI. By JOAN MEREDYTH CHICHELE PLOWDEN (Mme. C. JULLIEN). *London: Methuen and Co.*, 1940. 9×5½ *inches;* xvi+302 *pages; illustrations and maps.* 12*s* 6*d*

Drawn by the convent-fortress of Santa Katerina, innumerable travellers during the past thousand years have visited Southern Sinai, where from an intricate maze of desolate mountains rise the peaks of Musa, Katerina, and Serbal, each one of which in its turn has been identified with, or at least claimed as, the authentic Mount of the Law. Not content with following in the wake of her predecessors, Miss Plowden made her way from the convent through the much less known eastern part of the peninsula to Nuwaiba, and thence to 'Aqaba at the head of the gulf.

Much has been written on the route from Suez to the convent in particular, and on the peninsula of Sinai in general. Some records are overburdened with tedious scientific dissertation, others with tiresome speculation on the exact route of the Exodus. But this latest contribution by Miss Plowden can be commended as a readable and unembellished account of the inhabitants, country, and scenery. The author's modesty, descriptive talent, and ready acceptance of difficulties and set-backs, no less than her appreciation of the qualities of both Arabs and camels, will win her the esteem and goodwill of old-timers, many of whom regard the desert as holy ground and look askance at unappreciative intruders.

Criticism seems out of place when one considers what Miss Plowden accomplished. The recruiting of her guide and transport, at exorbitant rates, from the Pyramid Arabs was an initial error bound to lead to trouble, Sinai being split up into small areas inhabited by quarrelsome and competitive tribes, each jealous

of outside transport trespassing on its domain. That the author got through the second and much more difficult half of her trek, from the convent to 'Aqaba, speaks for her tact and tenacity.

Referring to the floods which spasmodically scour the normally dry water-courses of the country, Miss Plowden speculates on the time which must have been required, under such casual conditions of rainfall, to excavate valleys of such great depth and form the Sinaitic landscape. Probably however the general topography of the region is very much what it was ten thousand years ago. The denudation of the country, with the formation of its present configuration, was almost wholly accomplished in the moister period which preceded the rigorous arid climate of to-day.

'Once in Sinai' leaves nothing to be desired in production and illustrations. The route-charts and general maps are perhaps adequate, though they appear to owe little to the latest information available on Survey of Egypt sheets. The very pleasing picture "Storm cloud upon Jebel Serbal" (somewhat marred by the motor tracks in the foreground) was taken by the author, though in the index of illustrations it is ascribed to the present reviewer. Actually the two photographs reproduced from the 'Wilderness of Sinai' are those of Jebel Serbal and Pharaoh's Island in the Gulf of 'Aqaba. H. J. L. B.

HINTERLAND LIBERIA. By ETTA DONNER: translated by W. M. DEANS. *London: Blackie and Son*, 1939. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xiv+302 *pages; illustrations and sketch-map.* 12*s* 6*d*

I FOUND AFRICA. By VAN NES ALLEN. *London: Robert Hale*, 1940. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 282 *pages; illustrations.* 12*s* 6*d*

'Hinterland Liberia' is the most important ethnographical work on Liberia which has appeared since Professor Westermann's study of the Kpelle. It gives a vivid picture of the mental background of some little-known tribes, especially the Mano, the Dan, and the Kran. Two years' life among the people has given the author an insight into the psychology of the rites of the Secret Societies, some of the least known of these being the Gbasa, the Togba, the Wi, the Sigba, the Gli, and the Snake Society. Noteworthy chapters also are those on native women, the transmigration of souls, and masks and spirits. In the last, pp. 155–156, the statement that the system of naming children in the order of their birth is peculiar to the Mano people is incorrect. The Kono, Kisi, and some other tribes have the same custom. There are many sidelights on the social and economic life of the people. The reviewer notes that the iron currency in common use among the Gbande and Kisi is not once mentioned. There is an interesting description of the making of native gunpowder, and also of the *cire-perdue* technique in metal casting. Miss Donner thinks that Islam may succeed in giving political unity to the tribes. Why not Christianity? Muhammadanism in Liberia is very degenerate.

The illustrations are excellent, especially those of the women's initiation ceremonies. There is a valuable map into which unfortunately an error has crept. Grande (tribe) should be *G*bande (spelt Bandi by missionaries to avoid confusion). The Gissi tribe is now known as the Kisi (International Phonetic Orthography). The book lacks an index.

If to learn a new language is to gain a new soul, then Mr. Allen has found the soul of the Liberian hunters. His book will appeal to the schoolboy, the average reader, and the big-game hunter. With a passion for hunting and a deep sympathy for Africans, he found himself at eighteen at Cape Mount in Liberia. From there he travelled inland through the country of the Vai and Gola, up through the "haunted" forest of Kongbah to the border of the Buzi tribe. His

natural history information is interesting, and there is a striking legend of the Sun-Eagle. Mr. Allen's affection for the natives led him to render them first-aid, and his treatment of infants is to be commended. Now, on his return to Africa, he may be able to do great things for his Liberian friends, provided he avoids in the future sleeping out of doors in jungle swamps.

A map of the relative position of the villages visited and the Kongbah forest would have been most useful. This book also lacks an index. E. D. E.

AFRICAN HAZARD. By P. W. RAINIER. *London: John Murray*, 1940. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* x+288 *pages; sketch-maps.* 10s 6d

Into the first twenty-nine years of his life the author has crowded far more of interest and adventure, pleasant and unpleasant, than falls to the lot of most of his fellows in the threescore years and ten conventionally allotted to them. Amusing as some of the stories undoubtedly are, and far-fetched though they may seem to be, probably they exaggerate little: life in "the blue" in Portuguese East Africa and Nigeria prior to 1919, the date at which the autobiography ends, was often extremely rough and punctuated by the unexpected and barely credible. The author was born in Swaziland, and his wanderings in search of a living led him to the kraal of Dinizulu; to German South-West Africa, in search of diamonds; prospecting and elephant hunting in Mozambique; and finally after many ups and downs to working on a dredge near Macequece, an experience that was to serve him well on the other side of Africa at a later date. The account of the German South-West African campaign of 1914–15 has a real value, and the latter part of the story culminating in the German defeat at Gibeon is a stimulating record of making good in the face of almost overwhelming difficulties. The history ends with incidents of tin dredging, well worth the reading, in Nigeria. The book is simply and forcibly written, the pictures vividly drawn, and is never for a moment dull. There are four rather primitive maps of the countries concerned in the days when Germany had colonies and Kenya was still British East Africa. A glossary and index are provided. J. P.

MORE ROCK-PAINTINGS IN SOUTH AFRICA FROM THE coastal belt between Albany and Piquetberg mainly copied by JOYCE and MOLLIE VAN DER RIET, with . . . an introduction by DOROTHEA F. BLEEK. *London: Methuen*, 1940. $12\frac{1}{2} \times 10$ *inches;* xx+28 *pages; plates with text; map.* 42s

Bushman art, so-called, occurs in many parts of South Africa. It consists of both paintings and engravings, though these are but rarely found in the same district. Animals and human beings, sometimes singly, sometimes in groups, are pictured on the walls of rock-shelters or, in the case of engravings, on the rocks of boulder-strewn kopjes. The styles of the paintings vary in different parts of the country, and at least four distinct and more or less isolated provinces can be determined. In one or two of these, particularly in Rhodesia, a chronological series based on superpositions can be demonstrated, the paintings belonging to the different periods showing differences of style and sometimes of colour. But the whole subject is very complicated and hard to elucidate, though considerable work has already been done in the hope of answering the more obvious problems as to the identity and date of the various artists and the Stone Age cultures to which they were related. That some of the paintings and engravings were the work of bushmen tribes of recent times is undoubted; indeed the last "painter" only died somewhere in the sixties of last century. On the other hand some of the earlier colour work must belong to a more remote period, especially in the Rhodesian province where some of the art seems to antedate

anything known in the Union and can even be compared with the Eastern Spanish rock-shelter art, which in part dates back to late Palaeolithic times.

The present volume deals with a hitherto little-studied art province extending parallel to the coast but somewhat inland in the extreme south and south-east of the Union. Judging from the industries found in the painted shelters the art was the work of the Wilton folk, whose paintings and implements also occur at a late date in Rhodesia, whereas the better known because more elaborate ones in the Free State were the work of the Smithfield people. After an authoritative introduction, in which Miss Bleek does not shirk the complications of the subject but gives us her valuable opinion on them, there follow the twenty-eight plates, mostly in colour, with full descriptions of the sites on the opposite pages. Doubtless owing to some error in composition the description on the top of a page often refers to the panel reproduced on the lower half of the corresponding plate. "Patternated," for "patinated," occurs on plate 6B. The book as a whole is a valuable addition to our knowledge, and thanks are due to Miss Bleek and her artist helpers who have made this Wilton art of the southern province at last available for study. M. C. B.

NORTH AMERICA

COLIN ROBERTSON'S CORRESPONDENCE BOOK, SEPT. 1817 TO Sept. 1822. Edited with an introduction by E. E. RICH, assisted by R. HARVEY FLEMING. (Hudson's Bay Record Soc., II.) *London: H. B. Record Soc.*, [1940]. $9\frac{1}{2} \times 6\frac{1}{2}$ *inches;* cxxxii+372 *pages*

This is the second volume to be published by the Hudson's Bay Record Society, and like the first, which was an edition of Simpson's Athabaska Journal, it covers the important period of the amalgamation of the North-West and Hudson's Bay Companies. In a long and valuable introduction the editor describes the events leading up to that amalgamation and the part played in them by Colin Robertson. Robertson was employed by the North-West Company until 1809, when he left and offered his services to its rival. He urged the Hudson's Bay Company to develop the Athabaska fur trade, but it was not until 1814 that he was employed to initiate that development. During the next six years he played an important part in the activities of the Hudson's Bay Company, though he was, at the same time, an unsparing critic of its trading methods. His work included the re-establishment of the ill-fated Red River Settlement after its destruction by the North-West Company and the consolidation of the Hudson's Bay Company's interests in the Athabaska area. As Mr. Rich says, he "breathed a new spirit into the old Company," and it was partly due to him that by 1818 the North-West Company had passed to the defensive. After the amalgamation his career was very much of an anti-climax, though he remained in the service until two years before his death in 1842.

During this last period of his activities Robertson was in continuous dispute with his employers, in the course of which he compiled a letter book of his private correspondence to justify the part he had played in the history of the Company. It is this collection of letters which Mr. Rich has edited with skill and knowledge. The letters show Robertson as an able and ambitious man, though better as a man of action than as an administrator. He need not have apologized for "their present rude and unpruned state," for much of their charm and interest arises from this quality. "In delineating characters," Robertson wrote, "trifles (or what the world terms such) ellucidate with more accuracy the bent of a particular genius, than matters of great magnitude." Fortunately the letters abound in such trifles. They throw a great deal of light on Robertson and

his contemporaries and are valuable source material for this important period of the Hudson's Bay Company's history. Finally the value of the whole work is materially increased by the appendices. These include biographical sketches of the chief characters, supplementary letters of an official nature, and relevant documents such as the text of the agreement between the North-West Company and the Hudson's Bay Company concluded on 26 March 1821. The Hudson's Bay Record Society and its general editor are to be congratulated for maintaining in their second volume the high standard set in their first. T. S. W.

ECONOMIC DEVELOPMENT OF THE UNITED STATES: a first course. By CHARLES MANFRED THOMPSON and FRED MITCHELL JONES. *New York: Macmillan Co.*, 1939. 9×6 *inches;* xiv+794 *pages; illustrations and diagrams.* 18*s*

This volume is recommended as a reference book for British readers interested in the United States, as well as a text-book for students. The first two-thirds is divided into thirty-seven chapters, and these small units make it possible to give clear-cut views of the development of the country. The early chapters concerned with the colonial period will be more familiar ground in this country than those dealing with the growth of nationalism and the succeeding industrial growth. The story is carried forward smoothly and the treatment is greatly helped by chapter xvii, which deals with the country in 1860. From the general survey of the then essentially agricultural land, with but poor transport facilities, it is possible to follow the main tracks of enterprising citizens turning to industrial life. Chapter xxvii, dealing with the effect of the Great War on American life, is illuminating under present circumstances. The agriculturists more than doubled their returns on produce; wheat for example rose from 80 cents in 1913 to $2.00 a bushel in 1917. Prosperity ruled also in industrial circles and output was increased, although after the United States entered the war it had to be helped by restrictions at home such as meatless days. As in this country, increased wages lagged behind increased prices; this helped to limit consumption but encouraged capital commitments. Modern developments, such as government control (well summarized on pp. 501–2) are adequately treated by the authors.

The last third of the volume is invaluable, giving long quotations, mainly from well-known contemporary sources, over a period ranging from an advertisement for the Virginia Company in 1611 to recent Government publications on National Recovery. These are followed by a chronological list of events, which could have been amplified for some of the industrial items, to give a fuller picture. The volume is amply illustrated and indexed. A. C. O.

LET THE BAND PLAY "DIXIE." By URSULA BRANSTON. *London: Harrap*, 1940. 8½×5½ *inches;* 320 *pages; illustrations and sketch-map.* 11*s*

Let no one be deterred from reading this admirable book by a certain slickness of style, manifest in the title and in the chapter headings. Much must be forgiven to a B.B.C. producer who resigns her job and sets out to see realities for herself. In compensation for the slickness we have the dramatic dialogues, sometimes damning, always delightful, which no one but a producer could have given so well.

All sorts of people come on Miss Branston's stage—her fellow-travellers in the Atlantic Greyhound bus, broadcasting folks, college students and professors, but, more important than all, the administrators of the New Deal, who see the South as "America's Economic Problem No. 1," and who are engaged ruthlessly in the most dangerous attempt made to "mongrelize" the South since the

Civil War. Thus Miss Branston, whose intention had been to make a sentimental journey, in quest of "the America of the Elizabethans" and of the founders of the Republic, in fact shows us the South in the light, not of the Romantic Legend from which it has suffered so much, but of problems which are now world-wide, and her book is a very human and very moving commentary on these problems. She need not have hastened back to England in September 1938: she is of the spiritual stuff which will be at the heart of things wherever the frail body happens to be.

But she really must not call Vicksburg "the South's Verdun." Verdun—*absit omen*—was not a Vicksburg. R. A.

UNSENTIMENTAL JOURNEY. Written and illustrated by NORA CUNDELL. *London: Methuen and Co.*, 1940. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches; 244 pages; illustrations.* 12*s* 6*d*

This is a lively and humorous account of an Englishwoman's journey across North America, from New York over the Great Plains to Arizona, in a second-hand car which brought her safely after many minor adventures to a West which is still occasionally wild. The authoress found the attractions of Arizona so great that, having arrived for lunch, she stayed over a year at a trading post on the Navajo Indian Reservation. From this centre she set out to explore a part of America which is missed by most tourists, from the Marble Canyon and the Vermillion Cliffs of Arizona to the notorious Bad-lands of Utah, her haphazard excursions being interspersed with visits to a rodeo, to a performance of the Indian fire dance at Kaiboteth, and to the more sophisticated western coast.

This is an account more of the authoress's own personal experiences than of topographical description, for she labours under a sense of modesty where her powers of verbal description of scenery are concerned. The book is illustrated with good monotone reproductions of her paintings which one would have liked to have seen in their original colours, giving the untravelled reader a better understanding of the beauty of the Marble Canyon and Vermillion Cliffs which figure so largely in the narrative. Yet the preoccupation with people and customs, even if these are treated somewhat superficially, makes this an enjoyable work, carried through with the lightheartedness and zest which inspired the journey itself, and enlivened with a pungency of phrase particularly suited to the American scene. O. J. P.

GEOGRAFÍA ECONÓMICA DEL ESTADO DE NAYARIT. 206 *pages.* Geografía económica del Estado de Hidalgo. 404 *pages.* (Departamento de Estudios económicos, Secretaría de la Economía Nacional.) *Mexico, D.F.*, 1939. $9 \times 6\frac{1}{2}$ *inches; illustrations and maps*

The use of statistics as a foundation on which to plan economic development has in recent years become so general that few countries are without an organization to collect and collate statistical information. The need for a thorough appreciation of the vital statistics of the Mexican people and of the climate, geology, and natural resources of the country in which they live has been recognized by the Mexican Minister of National Economy, and the undertaking initiated by his department, of which these two volumes are the first-fruits, is ambitious and deserving of high praise. It was undoubtedly a wise decision that, in the first place, the competent authorities in each State should be responsible for supplying much of the statistical information regarding all important natural resources and human activities on which the prosperity of their respective communities is founded. Eventually it may be considered desirable to compile some of the statistics on a broader basis, when the development of the national economy can be planned on more general lines.

At present it is intended to publish a volume of economic geography for each of the States, containing reasonably concise information regarding their situation, physical characteristics, population, natural resources, productive capacity, sources capable of exploitation, home and external trade, industry, salaries, cost of living, taxation, credit, transport, communications, tourism, local art, etc. Information is also to be given concerning the social conditions in each State, the organization of labour in syndicates, agricultural communities, and co-operative societies.

The Mexican States vary very considerably in size, climate, and geological construction, so that each volume, although it is compiled in accordance with a standard plan, is likely to present an individual picture. If the standard set by these first two volumes is maintained, the complete set should be a most valuable guide for the authorities in planning the future development of the country. Hitherto commercial and industrial undertakings have sometimes suffered because they have estimated their prospects in the light of inadequate information. Promising factors in one locality have led to generalizations which have been unjustified. When the economic geography of the whole country has been written it will be possible to avoid such errors and to make orderly plans for the future from which the whole nation will benefit.

There are some striking facts in these two volumes concerning the States of Hidalgo and Nayarit which show that, although considerable progress has been made during the past few years, the need for further development along carefully calculated lines is urgent. According to the 1930 Census, Hidalgo has a population of about 680,000, 72 per cent. of whom are illiterate. The capital, Pachuca, has long been a mining centre, but it is probably the most unhealthy of all the State capitals. In 1930 the population of Nayarit was about 168,000, 62 per cent. of whom lived on the land. Rather more than 20 per cent. of the population were natives, 5 per cent. belonged to the white race and 73 per cent. were half-breeds. The illiterates amounted to 45 per cent. There are considerable possibilities for mining and the timber trade in Nayarit, but malaria, tuberculosis, and dysentery are prevalent; clearly education and medical science must make much progress in the State before the population can attain the prosperity which their undeveloped resources hold in store for them.

It is to be hoped that this enterprising work, which is being undertaken under the guidance of the Ministry of National Economy, will be completed as successfully as it has been begun and that it will show the way to better conditions of life for the whole population of that beautiful country, Mexico.

CENTRAL AND SOUTH AMERICA

REGIONALE GEOLOGIE DER ERDE. Edited by K. ANDRÉE, H. A. BROUWER, and W. H. BUCHER. Band 3. Jüngere orogenetische Zonen. Abschnitt IVa. The North American continent and the Caribbean region. By A. C. WATERS and HOLLIS D. HEDBERG. Abschnitt IVb. Die Kordilleren von Südamerika. By H. GERTH. *Leipzig: Akademische Verlagsgesellschaft*, 1939. 10×7 *inches;* 54+64 *pages* (*bound together*); *maps and profiles*. *M*.17

Band III of the 'Regionale Geologie der Erde' provides a vade-mecum to the structure and constitution of one of the two series of great mountain chains in the world, judiciously selecting from and summarizing an enormous amount of material. Parts of the strip running from the Aleutian Islands to Antarctica have been studied almost inch by inch, parts have little known of them and that based upon hurried sketchy traverses 100 miles apart. The limitations obviously implied are particularly noticeable in part IVa. The account of the ranges in

North America leaves the impression that it is written with the weight of real knowledge behind it; farther south, in Mexico and Central America, so many facts are unrecorded or perhaps distorted that the review of this region on similar lines may seem premature. On the other hand the statement of more controversial matters may lead to profitable discussion, though what is most needed are facts and more facts. The point most disturbing to the reviewer is the reiteration that the trends in Central America are north-west and south-east, whereas there are well-exposed sections in Costa Rica where the trend conforms to that in Honduras and is east–west. Part IVb is a welcome precis by Professor Gerth of his own more extensive writings. He makes it clear that the ratio of unknown to known is rather high, but is able to provide a fairly general treatment. He divides the Andes into the Caribbean, Central, and Antarctic Andes. The first and last exhibit striking similarities, but differ from the second, which is attributed neither to the compression of a geosyncline between two old rigid masses nor to the sharp disturbance of the edge of a jaunting continental block, but to the movements of deep-seated magma where a sheet of sial meets a body of sima; this has tilted the continental edge and erected the cordillera. Both parts conclude with a statement of some of the problems awaiting solution and provide a stimulating recital of work to be done. J. V. H.

ARGENTINE TO ANDES. By HANNA RYDH. Translated from the Swedish by MARY SANDBACH. *London: Blackie and Son*, 1940. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xii +172 *pages; illustrations and sketch-map.* 10*s* 6*d*

Only two of the archaeological sites visited by Dr. Hanna Rydh are off the beaten track: an untouched kitchen-midden in the Brazilian forest, near Iguapé, which she helped to excavate, and the ancient fortresses in the Humahuaca valley in the north-western corner of Argentina. But since she appreciates and describes them as a trained archaeologist, her accounts even of such accessible places as Cuzco and Macchu-Picchu are of interest, especially as she visited them shortly after the extensive excavations which marked the four-hundredth anniversary of the conquest of Peru. Part of her six months in South America was spent in studying at the archaeological museums at São Paulo, Buenos Aires, La Plata, La Paz, Cuzco, and Lima. She calls attention to the richness of the material housed in them, to the activity of South American archaeologists in the field and the study, and the warmness of their welcome to fellow workers from abroad. At the same time she points out that only a small proportion of the known sites have been fully excavated, and that many insistent problems are still unsolved.

As an introduction to the chief ancient monuments of South America, this book deserves warm commendation. The narrative and the other descriptive passages are of secondary interest, and the translation from Swedish at times reads rather stiltedly. There are many good photographs, a small-scale map of the continent, and a full index. G. I. C.

AUSTRALASIA AND PACIFIC

NEW GUINEA EXPEDITION, FLY RIVER AREA, 1936–37. By RICHARD ARCHBOLD and A. L. RAND. *New York: Robert M. McBride and Co.*, 1940. 10×7 *inches;* xviii+206 *pages; illustrations and maps.* $3.50

This is the story of an American biological expedition into the region of the Fly river in Papua and just across the border into the mountains of the Mandated Territory of New Guinea. The expedition was carefully organized and its plans were original and ambitious. A Fairchild Amphibian visited the inland

parties from its base at the coast and dropped supplies by parachute when there was nowhere for it to land. The parties kept in communication with the coastal base by specially designed portable wireless apparatus. Eventually the aeroplane was sunk by a storm at the coast and the inland parties had to beat rather a hasty retreat down the Fly river on improvised rafts. There was plenty of incident on the retreat, and the story is told in a straightforward, unexaggerated way. Elsewhere in the book the account of the day-to-day experiences of the expedition is a little tedious, and it would have been better to have arranged the book by subject instead of adhering to chronological order. The main object of the expedition was the collection of animals, particularly birds, but there is very little interesting natural history information till towards the end.

The book is profusely illustrated with photographs, nearly all of which appear to have been taken with miniature cameras and enlarged beyond the capacity of the negatives. One recognizes the difficulty of photography on such an expedition, but only two or three of the results (*e.g.* the photograph on p. 175) are technically good. J. R. B.

FIJIAN FRONTIER. By LAURA THOMPSON. Introduction by B. MALINOWSKI. (Studies of the Pacific, No. 4.) *New York: American Council, Institute of Pacific Relations*, 1940. 9×6 *inches;* xxvi+154 *pages; illustrations and sketch-maps.* $2

Dr. Thompson describes the impact of European forces—economic, political, religious, and educational—on a relatively isolated southern section of the Fijian Islands. After a brief description of indigenous culture, she sketches its partial breakdown under European influence. At the same time she emphasizes the vigour which indigenous institutions still possess. Most interesting in this connection is the partial reintegration of native culture following the decline in price of copra and consequent attenuation of European influence (pp. 93–4). This and other manifestations of native cultural vitality support her suggestion that indigenous economic and social institutions are capable of more constructive development by Government with a view to economic and social self-sufficiency Some may hold that a more far-sighted policy of conscious adaptation to civilized life should be pursued. But for the present, cultivation of indigenous culture as suggested by Dr. Thompson seems to be more practicable.

The treatment of a wide range of problems is in parts necessarily condensed, but the authoress gives many references to her more detailed publications and documentation is, on the whole, adequate. Only in dealing with the rôle of an alleged "spiritual force" in population growth (pp. 139–40) and with early culture history of the group (pp. 18–22) does she go beyond the evidence. Her suggestions concerning the influence of "psychological factors" on population demand reconsideration in the light of Dr. Hogbin's divergent conclusions regarding depopulation in the Solomon Islands. As to early culture history, she says that "the story of the peopling of these islands is a part of the story of the peopling of Oceania, *which has not yet been completely unravelled*" [italics ours]. It would be more correct to say that it is, and will probably remain, a tangle of pointless guesswork.

Dr. Thompson's picture of contemporary culture change is a general but not a superficial one. It brings to light the broad characteristics of the influence of Western Civilization upon primitive culture. Many of her observations could be paralleled in Africa and elsewhere: for example, growing individualization of the marriage relationship with its social, economic, and ceremonial implications; substitution of loyalties and forms of organization based on locality for those of kinship and rank; resort to magic, growth of secret cults, and emergence of

messianic movements as protests against European encroachment. The bearing of these on comparative social anthropology and on the study of culture contact in particular is discussed by Professor Malinowski in his Introduction.

This is an admirable general introduction to the study of acculturation in the Pacific, valuable alike to the general reader, to the specialist, and to those concerned with the practical problems of culture contact. R. P.

POLAR REGIONS

SCOTT OF THE ANTARCTIC: a study in character. By GEORGE SEAVER. *London: John Murray*, 1940. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 188 *pages; illustrations.* 10*s* 6*d*

Captain Scott, his chief subordinates, and his expeditions have probably been more voluminously written up than any other contributors or contributions to polar exploration. Perhaps the best estimate of Scott's character is still to be obtained by the discerning reader from his own accounts of his two expeditions. Nevertheless the present study has been worth while. Mr. Seaver brings to his task special qualifications. He has of course had access to the works of his predecessors, and has made good use of them. He knows many of the surviving members of the expeditions and is in touch with the Scott family. He has already proved his value by intimate studies of the two men who died with Scott in the tent on the Ross Barrier in March 1912.

The result is a shrewd analysis of Scott's character. He shows us how the boy was father to the man. We are reminded of the self-distrust and introspection of the rather sickly youth. We see how these, and tendencies to dreaminess and untidiness, were overcome by self-discipline and the training and experience of life in the Navy until the self-reliant officer emerged, capable of dealing with any men or any situations, however difficult or hard. We see, again, the naval veneer wearing somewhat thin under the day-to-day annoyances and frustrations that beset the polar leader throughout a long expedition. But these trifling irritabilities fade into insignificance before the sterling qualities of a really fine character when crisis supervenes, whether crisis connotes triumph or disaster. Throughout the account of his Antarctic work, too, we are reminded of what to many of us is the outstanding fact, that Scott was at heart as much a scientist as an explorer, so that his expeditions must be judged not by the success of their pole-seeking but by their general geographical and scientific harvest.

In his assessment of the essential factors which led to the tragedy, the author is on more controversial ground. Many people will disagree with his verdict that Scott added to the strength of the final party by departing at the last moment from his original plans. The change from 4 : 4 to 5 : 3 was a bad mistake. If it had merely been a substitution of Bowers for P.O. Evans, Mr. Seaver's verdict might be accepted. Evans, brigaded with four men of the officer type, was practically in a thought-tight compartment by himself and so was likely to be the first to fail once the party found themselves forestalled. Again, no mention is made of the onset of scurvy as a factor in the loss of the party. Though overt symptoms had not appeared, it is likely that the debilitating effects of the lack of vitamin C played at least as much part as abnormal weather conditions in reducing the final marches below the safety limit. Even if things had gone better in the first autumn and One Ton Depot had been established at 80° S., the party could not have got back, in the reviewer's opinion, unless their vitamin supply had been renewed.

Mr. Seaver has been very happy in his extracts from Scott's own diary He has however been led into one error by a habit that Scott shared with Shackleton. Both used to jot down quotations from the books they read, and it is easy

to get these mixed up with their own original thoughts. The extract quoted on p. 120: "The long mild twilight which like a silver clasp unites to-day with yesterday; when morning and evening sit together hand in hand beneath the starless sky of midnight," is not Scott. He might well have written it, but he did not. It will be found, also as a quotation, on p. 199 of McClure's 'Discovery of the North-West Passage,' which was published in 1857 and from which Scott probably extracted it many years ago. R. E. P.

PHYSICAL AND BIOLOGICAL GEOGRAPHY

STRUCTURAL AND FIELD GEOLOGY FOR STUDENTS OF PURE and applied science. By JAMES GEIKIE. Fifth edition revised by ROBERT CAMPBELL and ROBERT M. CRAIG. *Edinburgh: Oliver and Boyd*, 1940. 9×6 *inches;* xxiv+396 *pages; illustrations, maps, and diagrams.* 25*s*

It is satisfactory that this book has reached a fifth edition since it first appeared in 1905. In the preface to the first edition the author expressed a hope that it might be useful, not only to beginners in field geology, but also to students "who are preparing for professions in which some knowledge of structural geology is of practical importance." Since that date the practical applications of geology have increased greatly: the construction of tube railways and arterial roads, increased water supply whether from underground sources or by the conservation of surface water, the deeper foundations of heavier buildings, not to mention dug-outs and air-raid shelters, underground storage of explosives and liquid fuels, and other warlike operations, all demand precisely such knowledge of geology as is provided in this book.

The pure geologist, while needing other books to cover such subjects as palaeontology, will find much of the material common to all text-books unusually well expressed here; the figures, particularly those showing the effects of structure on outcrop, are excellent; the plates were a great feature of the first edition and now number sixty-nine, the microphotographs of igneous rocks being new. The advice occasionally to draw profile sections to true scale should be given to all geographers: the result is usually a revelation. It is curious that the reviewer of the first edition for this *Journal* should have considered that only the mining engineer would derive much benefit from the book, whereas in the opinion of the present writer it is essentially a book for the civil engineer: to take a single subject, the siting and construction of reservoir dams, it would be possible to point out cases where an engineer's knowledge of geology derivable from the book would have saved public funds amounting to millions of pounds. The re-writing of chapters I to V dealing with rocks and minerals, though necessary, has no special appeal to engineers, and it may therefore be worth while to draw attention to some points in the remainder on which further revision is desirable. The corrosion of metal pipes laid in clay has recently been much to the fore; the chief cause of this, namely the presence of selenite or sulphate of lime, should be mentioned. In the section on water supply distinction should be made between porosity and permeability; for example, chalk is highly porous, *i.e.* it will absorb a large quantity of water; but the pores are minute and the permeability comparatively low, *i.e.* water does not flow through it rapidly to reach a boring from which it is being pumped. The section dealing with water pollution by sewage is excellent and much needed; a sentence or two dealing with the siting of cemeteries might be added, and perhaps one for the medical men who constantly advise patients to "live on a gravel soil": many gravel deposits are completely waterlogged, whereas a dry soil is presumably intended. It might be well to introduce a few of the commoner rock names used by miners

and others, such as blaes, bind, or clunch. In the chapter on surveying, a sentence is repeated from the first edition describing the use, for mapping under a thin superficial covering, of a "gouge-like spud" or "exaggerated cheese-taster"; this should be replaced by mention of the auger now universally used in such circumstances. The bibliography to this chapter needs bringing up to date.

Here and there the Scottish origin of the book accounts for points which strike an Englishman as curious: the text of the first edition said that "the Tertiary deposits of this country" might be "looked upon as superficial accumulations." A footnote somewhat modified the statement, but both are reproduced in the present edition. In southern England these "superficial" accumulations are more than 2000 feet thick. The term "liver-rock" is unusual and seems to be equated with freestone, which is defined as a fine-grained homogeneous sandstone capable of being tooled equally well in any direction; the majority of British freestones are limestones. Considerable revision is required in the table of strata at the end: river terraces should be included in the Pleistocene, moraines should be placed here, not in the Recent or Neolithic class, and submerged forests might also be mentioned; the Ampthill clay should be added beside the Coral Rag, and shales, which form more than half of the Millstone Grit formation, should be added to the "thick sandstones" which at present define it. The last is just the kind of point which is well brought out in the text; a cutting or tunnel through sandstone is a very different proposition for the engineer from one in shales or in a combination of the two. If some of the above criticisms seem carping, they are made in the hope of improving still further a book which admirably serves its purpose. C. N. B.

THE ORIGIN OF SUBMARINE CANYONS: a critical review of hypotheses. By DOUGLAS JOHNSON. (Columbia Geomorphic Studies, 3.) *New York: Columbia University Press* (*London: H. Milford*), 1939. $9\frac{1}{2} \times 6$ *inches;* x+126 *pages; illustrations and maps.* 15*s* 6*d*

This is a publication in book form, with but slight alteration, of a series of articles which appeared in the *Journal of Geomorphology*. The author reviews some of the theories that have been advocated from time to time to explain the occurrence and form of the submarine canyons that notch, in many places, the outer margins of the continental shelf. Twelve different hypotheses are examined, but with varying degrees of thoroughness; hypotheses involving a tectonic origin for example are dismissed, somewhat arbitrarily, in one page, while the discussion of turbidity currents, at the other extreme, occupies thirty-four pages. The form of the canyons seems to demand a sub-aerial origin, but the enormous vertical oscillations of land or sea-level that must be postulated in any such explanation, and the absence of evidence confirming oscillations of such magnitude, present an insuperable obstacle to acceptance. The author therefore favours a submarine origin and has his own theory which he expounds at length in the last thirty-five pages, namely by a process of submarine spring sapping. The artesian conditions of the continental shelves are examined, both as they are to-day and as they were in the geological past, and the competence of the process to excavate canyons is estimated and considered to be adequate. The nature of the problem however makes proof difficult, and the impression remains that this latest hypothesis, like the other eleven, is possible but not yet convincing. A. A. M.

ONE DAY TELLETH ANOTHER. By STEPHEN A. IONIDES and MARGARET L. IONIDES. *London: Edward Arnold and Co.*, 1939. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xii+324 *pages; illustrations and maps.* 10*s* 6*d*

This is not a text-book of astronomy but a discourse on the influence of astro-

nomy on human life, the chapters dealing successively with the seasons, the sun, the moon, eclipses, planets, comets, calendar, precession, etc. The work is scholarly and of considerable value in bringing into prominence a number of associations which the reader may have forgotten. There is much information which will appeal to the general reader, who may be interested to learn, for example, that the brilliance of the planet Venus is due to reflection from dense clouds of dust in its atmosphere or that the constellations, by agreement among the component stars in proper motion and coloration, may sometimes form even better natural groups than the ancient sideronomists thought. The account of the belief through the ages in comets as portents of evil is entertaining.

The explanation of Saros in relation to other eclipse series is not so clear as could be desired, and the attempt to formulate in simple language the notion of time as a dimension of space might very well have been amplified. The chapter on seasons is somewhat defective, since confusion of ideas arises from the addiction of the authors to the illogical system which makes winter and summer begin at the solstices and spring and autumn at the equinoxes. This so-called "astronomical" system was traced by the late Dr. J. K. Fotheringham back to Geminus of Rhodes about 70 B.C., and it is still unfortunately perpetuated by some almanacs and newspapers and taught in schools. In the true astronomical sense December, the darkest month, is midwinter, and June, the lightest, midsummer, though the complete definition of seasons must take into consideration the important climatic phenomenon of thermal lag behind the solstices.

In an introduction the authors say that no more "horrible fate" could overtake their book than to have its chance remarks taken too literally. Many of the comments are agreeably in line with their conversational style, though a few interjections of this kind are pointless and irritating in the printed page. The numerous illustrations greatly enhance the value of the work. L. C. W. B.

ECONOMIC AND HISTORICAL GEOGRAPHY

ECONOMIC GEOGRAPHY; industries and resources of the commercial world. By CHARLES C. COLBY and ALICE FOSTER. *Boston: Ginn and Co.*, 1940. 9×6 *inches;* xviii+686+22 *maps*+xvi (*index*) *pages; illustrations and maps.* 10*s* 6*d*

THE NEW ASPECT GEOGRAPHY—COMMODITIES. By C. MIDGLEY. *Exeter: A. Wheaton and Co.*, 1939. 8½×5½ *inches;* 272 *pages; illustrations and sketch-maps.* 3*s* 4*d*

Economic geography is for Professor Colby and Miss Foster "the livelihood of mankind," restricted however to the leading commercial nations. After a short section on general considerations, including natural resources and conditions, communications, and the distribution of population, the arrangement is regional, the principal commodities being treated in relation to the chief producing areas. This has some disadvantages: the wool industry for example is discussed only in the closing pages on the southern hemisphere. Special attention is given to the interrelations of the larger economic regions; thus the first regional section deals with tropical America, stressing its commerce with the United States. Half the book is concerned with the United States, and it is this portion which will probably be of most use to British readers. The treatment of other regions is of necessity compressed; the phrasing of the chapters on the British Isles does not suggest first-hand acquaintance. In addition to the elucidation of the general natural resources which have favoured the location and growth of particular industries, the channels of trade, the business organization, and the technique of manufacture are described in greater detail than is usual in

books of this type. Other factors however than the natural affect the livelihood of mankind, and these have been largely omitted, perhaps designedly. There is no mention for example of the marketing problems which face the wheat producers, or of the effect of fiscal policies or capital investment on production. The book is a straightforward and readable, if a little diffuse, introduction to the distribution of industry and agriculture throughout the world.

Mr. Midgley's book deals with the same facts as the above, simply and in lesser detail. He takes the principal agricultural and industrial products in turn, explains their distribution, methods of production and manufacture, and their part in everyday life. His book supplements the ordinary geographical text-book, where these aspects cannot be treated at length, and imparts interest to statistical summaries. The text is accompanied by generalized sketch-maps and clear comparative diagrams. The scope is wide, though he has omitted potash and phosphates, important as artificial fertilizers. In his discussion on the industrial nations he has surely put the reasons for their activities in the wrong order. The "enormous populations," unable to grow sufficient food for themselves, are the result rather than the cause of industrial concentration; many of these populations also could grow a much higher proportion of their food if they were prepared to forgo the profits of industry. G. R. C.

EDWARD WHYMPER. By FRANK S. SMYTHE. *London: Hodder and Stoughton*, 1940. 9×6 *inches;* xiv+330 *pages; illustrations and two folding maps.* 21*s*

The golden age of mountaineering is usually held to begin with Mr. Alfred Wills' ascent of the Wetterhorn in 1856. It may with justice be reckoned as closing with Whymper's ascent of the Matterhorn in 1865. There had been climbers before Wills; indeed his was the fourth ascent of the Wetterhorn. After 1865 there still remained isolated summits to be climbed; whole districts of the Alps to be opened; new standards of difficulty and of accomplishment to be set, and new technical methods to be evolved. But in those ten years mountaineering took its place among the accepted holiday pursuits. In that time also, or of that time, the classic Alpine literature was written, and amongst it Whymper's 'Scrambles among the Alps' took the foremost place from the moment of its appearance. It owes that place to many things. First is the achievement of its author, which is its theme. 1865 was Whymper's sixth season in the Alps, and only his fifth season of climbing which could reasonably be called serious. Secondly, the story told is built round one central theme—the struggle between one man and one mountain, culminating, at the eighth attempt, in victory, and in a catastrophe which will always strike the imagination the more because it followed closely upon success. Thirdly, Whymper possessed, or had acquired, a prose style admirably adapted to the purpose. As a boy of eighteen he had recorded in his diary that "a simple style, natural and unaffected, not too minute, but describing with power, will produce more effect and *affect* the mind more than the loftiest or grandest matter written in the most magnificent manner." Mr. Smythe censures Whymper for on occasion transgressing this maxim. But it must be remembered that Whymper wrote on occasion as one deeply moved and as having faced issues of life and death. On the whole the reader is left wondering at the rapidity, the clarity, and the vigour with which the story is told.

The maturity also both of the judgment and of the style are cause for wonder. Whymper was twenty-five at the date of the ascent of the Matterhorn. The son of a draughtsman on wood, who was never financially prosperous, educated at an obscure school in South London, and taken thence at the age of fourteen to

be bound apprentice to his father, he came among the Alpine brotherhood at the age of twenty, with very little previous experience of the world. Yet the six seasons of his active climbing career show him as he remained to the end of his life—physically strong, intellectually self-reliant to the point of arrogance, determined and courageous, but inwardly more liable to touches of emotion and of admiration, both of beauty in nature and of character in men, than he would admit. He climbed with several of those who were then most distinguished; but he seems at his best when climbing alone with guides. Among amateurs he never made a close friend; among guides he acknowledges his debt to such men as Croz and Almer, and his praise has placed J. A. Carrel among the immortals. But his private diary, now first published, records his grievances against Croz in the Alps and against Carrel in the Andes in bitter tones. They cause one to guess, perhaps wrongly, that incompatibility, as much as chance, in Croz' case, and deliberate treachery in that of Carrel, may have led to the severances in 1865, which were to lead to the reunion at Zermatt on July 11 and thus to the final disaster.

After 1865 Whymper made one famous and successful tour among the Great Andes of the Equator, two expeditions to Greenland, and three, which did not add to his reputation, to the Canadian Rockies. He also paid many visits to the Alps; but his serious Alpine career was over. He lived on for many years—his fame growing as he became more and more the living embodiment of a legend, somewhat unapproachable, somewhat solitary, and, it must be added, somewhat easily provoked. Sitting outside the Monte Rosa hotel, with the mountain which he had conquered standing above him, and the feet of those whom he had inspired passing up the village or returning in triumph, he was surrounded with an air of mystery; and those who had trodden where he had shown the way acknowledged him as their master.

From these things comes the peril of his biographer. Whymper's days of most interest and greatest achievement have been recorded by himself, and no later narrative can equal his own. It is high praise for Mr. Smythe to say that this book was well worth the making. The diary, especially of the early years, is a human document, which, while it deepens the shadows, also illuminates. Mr. Smythe finds it "sad, very sad." It is possible to look at it more objectively; it is a chronicle of little things: the sermon at the Baptist chapel, the date of the Derby, the price of a railway ticket to York, Surrey's success at the Oval. But through it there emerges the picture of a boy, who did not change greatly as he became a man, of indomitable will and of fixed purpose, lonely, but sufficient in himself, and having all the qualities which, to whatever task they were bent, could make him great. C. S.

GENERAL

COLLINS-LONGMANS STUDY ATLAS. By K. H. Huggins, J. M. Parrish, S. A. Workman, and J. C. B. Redfearn. *London: Longmans, Green and Co. and Wm. Collins Sons and Co.*, 1939. 11½×9 *inches;* 110 *pages* (*including* 48 *pages of maps*) + viii (*plates*). 5*s*

Care has been taken to design this atlas as a whole and to make it as comprehensive as its size permits. The blue and green tones used in the uniform layer colouring are pleasant, but where the reds and browns predominate the effect is rather crude, and it is a pity that the lettering is so commonplace. The amount of detail shown is kept to a minimum, as are the place-names. Some of the maps, *e.g.* Europe and Africa on a double sheet, are unusual in atlases of this type, though it is not clear why the East Indies also receive a double sheet. In addition

to the physical maps, there are others dealing with the climate, vegetation, products, and population of the world in general and, in more detail, of Europe and the British Isles. The relations of these features are emphasized by a diagram of "visible regions." The section on Great Britain is interesting; it includes a land utilization map on the scale of 1/2½M, though no geological or soil map, and an economic map of Lancashire, Yorkshire, and the Midlands, as well as maps of agricultural and industrial distributions.

The text consists of 1100 questions, interspersed with brief explanations and occasional statistics. Though this method ensures study of the maps, it may be doubted whether it is the best way of imparting knowledge. On the chart of visible regions, London is perhaps not a very suitable choice as a place typical of a region extending to 90° east. This chart also indicates that the southern temperate grasslands are peopled by races other than white or yellow. West Africa has been omitted as a manganese producer, and among tropical products there is no indication of vegetable oil plants. The sketch-map of world airways is inadequate. These are small points however and the atlas, moderately priced, should have a wide circulation. G. R. C.

EUROPE OVERSEAS: a survey of modern empires. By S. J. B. WHYBROW and H. E. EDWARDS. *London: Dent*, 1939. 7½×4½ *inches;* xii+180 *pages; maps and diagrams.* 5*s*

This book was planned to provide information upon which a judgment on the colonial question might be formed. The authors give a concise account of the history, geography, and economic development of the overseas territories of European powers. By the inclusion of the British Dominions the contents are more comprehensive than the plan required, for the colonial question is concerned more with trading colonies than with colonies of settlement. The details demonstrate the now familiar contention that the pre-1914 German colonies contributed little to the economic power of Germany. The authors purposely avoid reaching definite conclusions, but tend to the opinion that the colonial controversy is largely psychological. It is however merely a part of the whole question of raw material supplies and overseas markets, a subject outside the scope of the book. Had the United States been included, it would have been more apparent that political sovereignty is not essential to economic expansion. Some points might have been elaborated, particularly the various forms of government favoured by the European nations. While the White Australia policy is noticed, the presence of foreign communities in Western Canada escapes attention. The part of Britain in the abolition of the African slave trade also deserves some mention. The book however contains much information in a remarkably short space, and has a number of sketch-maps. G. R. C.

SAILING TO SEE. Picture cruise in the schooner *Yankee*. By Captain and Mrs. IRVING JOHNSON. *London: Robert Hale, Ltd.*, 1939. 10×7½ *inches;* 223 *pages; illustrations.* 12*s* 6*d*

STARS TO WINDWARD. By BRUCE and SHERIDAN FAHNESTOCK. *London: Robert Hale*, 1939. 8½×5½ *inches;* 286 *pages; illustrations.* 12*s* 6*d*

This is a modest account by Captain and Mrs. Irving Johnson of a second voyage round the world in their schooner *Yankee*, manned by an amateur crew selected with much care. They left Gloucester on 1 November 1936 and were away eighteen months. The description is mostly photographic, and it is unfortunate that many of the pictures have lost considerably in reproduction; however there are more than enough good ones to show the ship's company enjoying their adventures, as well as the beauty and interest of many islands and

harbours visited. The collection of pictures of varied types of country craft is particularly good.

After the full description of the first voyage given in 'Westward' the authors have limited this book to nine short chapters; the most attractive one being of life on Pitcairn, by Mrs. Johnson. She lived ashore for several days and became familiar with the social system which the descendants of part of the crew of the *Bounty* have evolved for themselves. The story she tells is of a small community living a simple, healthy, hard life in very restricted conditions, carrying out the arrangements necessary for the general well-being of the whole with friendly consideration for the individual. Captain and Mrs. Johnson have learnt not only to sail a small ship safely round the world, but also to keep twenty adventurous young people fit and cheerful under varied conditions at sea and ashore, where so many before have failed.

'Stars to windward' is a story of a world voyage in a vessel similar to the *Yankee* undertaken by two brothers, with a mixed crew of friends and passage workers, made possible by a legacy left to them for the purpose. They started from Manhasset Bay rather overloaded with romantic ideas of adventure and an urge to make startling discoveries in science; but being prodigal of health and stores, as well as haphazard in seamanship, they gave themselves great hardship, and only escaped tragedy by the vitality of youth and the luck which sometimes goes with it. Long stays in unremote harbours with convivial companions and the extra draft at sea caused by liquid stores seem to have accounted for most of their troubles, and they were fortunate in being able to sell their ship in Manila before they came to grief. Their further adventures in Peiping were gruesome and give an impression of the sudden blast of modern war on an old and cultured city. The illustrations are good, but the book is disconnected and adds little to the knowledge of the few Pacific islands visited. R. H.

WIND FROM THE EAST. By W. H. Potts. *London: Blackie and Son*, 1940. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches; 244 pages; illustrations.* 10s 6d

There was no false romanticism in Mr. Potts' urge to give up ease and comfort in the search for adventure: he possesses a sense of humour, and does not take himself too seriously. He gave up a comfortable City post, and in November 1935 shipped as an apprentice in a Finnish wind-jammer for Australia; went overland to Sydney; joined Dwight Long's ketch for New Guinea, where he had an adventurous excursion with a gold prospector. Then he went on to Bali, climbing to the top of Mount Agung. His biggest adventure was the journey from Shanghai, up the Yangtze, and on to Tatsienlu on the Tibetan border. He managed to see a corner of Tibet, passing through "the Kingdom of Muli" to Likiang, whence he returned to comparative civilization at Tali. From there he crossed into Burma, arriving at railhead at Myitkyina. Still not satisfied, he goes through Manipur and Assam to Bombay, where he leaves us, hoping to be home by Christmas 1937.

He usually travelled fourth class, when there was one, earned a bit as he went, mixed with the natives, picked up their languages, and got on well with them. He must be a man of courage and determination and withal of wide human sympathy. His journey recalls those of the medieval pioneers, and he presents his story in picturesque and effective fashion. There are excellent illustrations mostly from the author's own photographs. A sketch-map of his route would probably have added to the pleasure of most readers. A. S. E.-S.

THE MONTHLY RECORD

LAND RECLAMATION AND THE STANDARD OF LIVING IN ITALY

A brief but interesting publication by Silvio Trentin, "Dalla bonifica integrale al 'pane del'Impero'" (Paris, 1939), draws attention to aspects of land reclamation in Italy which seem to some extent to have escaped notice. The achievements of the last decade in Italy and Africa are there for all to see, and have recently been described in this *Journal* (Sir E. J. Russell: "Agricultural colonization in the Pontine Marshes and Libya," *Geogr. J.* 94 (1939) 273–92). It is not always remembered however that land reclamation has a long history in Italy, even if, for practical purposes, it can be said to begin with the Legge Baccarini of 1882, in which the State assumed direct responsibility for land reclamation, which was to be undertaken either through its own officials or through *Consorzii* of proprietors. Later, including all the most recent, legislation has followed these lines, and its importance in a country in which barely one-fifth of the land surface is plain needs no stressing. The bulk of the reclamation completed before and after the last war affected the Po basin and the north, which responded better than the south to the rationalized and intensified farming aimed at. About 1,500,000 hectares were involved, on which work was either completed or in progress, leaving about 500,000 hectares still to be tackled in 1924.

Work which had suffered previously from lack of adequate finance was, after 1924, given the full support of the State. Difficulties however were increased when self-sufficiency in wheat was joined to reclamation: it put a premium on the growth of cereals (which now account for about 40 per cent. of cultivated land) at the expense of forage crops, vines, citrous fruit, cattle (the drop in which has been substantial and particularly affects the south), and silkworms. Olives and beet remain stationary; maize has increased, a 10 per cent. adulteration of flour with maize being compulsory. The grain crop has been increased from an average of about 60 million quintals 1923–25 to about 70 million 1936–38 (79 in 1937), but this has meant that, despite land reclaimed, much unsuitable land is still given over to wheat; one effect has been the paralysis of the reafforestation schemes, a matter of especial consequence in Italy. Nor is it always clear that the lot of the agricultural worker has been improved. The number of day labourers, working in 1937 120–180 days a year for *lire* 1.20 an hour (in the south), has diminished, but the extension to reclaimed land of the *compartecipazione* system has followed changes in the laws affecting the engaging of agricultural labour. The *lavoratore a partecipazione* is not a small proprietor: he cultivates at the orders of the landlord a strip of 1–3 hectares, receiving one-third of the proceeds; the contract may last only a few months. Trentin gives some interesting details of the family budgets of such labourers. He touches also on the malaria problem, and the check imposed on it. He concludes with an attempt to discuss the cost of land reclamation and the likely returns. Its supporters have never minimized the amount of capital required on which no return could be expected; such sacrifice however is not without effect on the standard of living, evidenced by the 12 per cent., 1923–36, fall in the consumption of flour shown by official statistics.

AN OVERLAND JOURNEY TO INDIA IN 1700

In the spring of 1700 the London East India Company, then at grips with the rival body established two years before by Act of Parliament, found itself in

urgent need of communicating information and instructions to its servants in India. The ships of the season had departed, and in any case the Cape route was too lengthy to be used. In this emergency the offer of a certain William Daniel (of whose antecedents nothing seems to be known) to carry the despatches overland was accepted, and on May 4 he started on his mission. Passing rapidly through France to Marseilles, he got by sea to Alexandria on June 20. From thence he wrote to Mr. Fleetwood, the British Consul at Cairo, asking his advice as to the feasibility of proceeding down the Red Sea to Jiddah and there catching the Indian ships, which usually left on their return voyage about the end of August. Meanwhile, in case he had to adopt the alternative route by Aleppo and the Euphrates valley, he hired a vessel for Scanderoon.

However Fleetwood's reply proved so encouraging that Daniel proceeded to Cairo, where he received assistance not only from Fleetwood but also from an English renegade of the name of Gardiner, who procured for him a *farman* from the Pasha of Egypt and gave him some useful introductions. Armed with these, Daniel set out on July 7 for Suez, and there embarked for Jiddah. After many adventures and tiresome delays he reached that port on August 29, only to find that the Indian fleet had left three days earlier. In the hope of overtaking it, he pushed on to Mokha, arriving there on September 13. However the fleet had passed that port, and no other conveyance was available; so Daniel had to content himself with entrusting his letters to an Indian bound for Muskat, upon a promise that they should be sent on to Surat from that place. Later he heard that the Indian fleet had been cast away on its voyage; and he was able therefore to congratulate himself on having missed it.

Daniel's return journey was as adventurous as his outward one. He paid a visit to the monasteries on Mount Sinai; and on his return to Cairo he had to strip himself naked and bathe in vinegar and water before being admitted to the English consulate, which was isolated owing to the ravages of the plague. He finally reached England on 21 December 1701.

Daniel's narrative of his experiences was printed and published in the following year, as an octavo pamphlet of one hundred pages; of this the British Museum possesses three copies. Within the last few weeks the Society has come into possession, by the courtesy of the British Records Association, of a contemporary manuscript copy of the narrative. The watermarks of this document have been identified by Mr. Heawood as those of a Dutch paper much used in this country in the early part of the eighteenth century; while the handwriting is also of that period. It seems safe therefore to conclude that it is one of the copies circulated by Daniel in manuscript, before his work was actually put into the press. W. F.

THE CLAY BELT OF ONTARIO AND QUEBEC

In the *Scottish Geographical Magazine* for January last, Mr. J. R. Randall gave an interesting summary account of the development of agriculture in the great clay belt of Canada. This area of about 40,000 square miles in Ontario and Quebec is the largest potential arable area in the Laurentian Shield. It owes its development to the building of the Canadian National and the Temiskaming and North Ontario Railways in the early decades of the century. To-day 5 per cent. only of the area is farmed, and most of the 81,000 inhabitants live in that portion. The principal difficulties with which settlers have to contend are climatic, especially the variability of the frost-free season, the danger of summer frost, and heavy rains in late summer and early autumn. The present stage is mainly that of subsistence farming with some dairying. The farms are of the same general character throughout, though varying in

detail from south to north. In the south the average size is 148 acres, of which 28 per cent. is crop land, and 5 per cent. improved meadow and fallow. Hay, clover, oats, barley, and wheat are the principal crops, with some root crops and vegetables. The average number of cattle per farm was 8·4, of which slightly less than half were giving milk in 1931. The establishment of these farming communities has owed much first to lumbering, then to the mining centres to the south, and also to the demand for paper and wood pulp. These, besides offering a market for the produce of the area, have provided the settler with alternative employment and have helped to carry him over the initial stages of development.

Mr. Randall gives some interesting details of the work and organization of the farms. Owing to the shortness of the growing season, ploughing must be done immediately after harvest, and the various crops ripen at approximately the same time. In clearing a farm, it is about seven to ten years before the crops will support the farmer, who depends in the interval largely upon the sale of the timber. At present the area depends on outside sources for its meat supply, but dual-purpose cattle, hogs, and sheep are being encouraged. The average value of a farm is about twice that of the poorest in Quebec and Ontario, but only a half to a third that of many in the Great Lakes and St. Lawrence areas. Despite isolation, difficult conditions, and dependence upon markets which may decline, the writer believes that should purely subsistence farming develop, the prospects are better than those attending other attempts at farming in the Laurentian Shield.

THE GEOGRAPHICAL SOCIETY OF MONTREAL

We have pleasure in recording the foundation of the 'Société de Géographie de Montreal,' with M. François Vézina as President, and Dr. Benoît Brouillette as Secretary-general. The Society is housed at the École des Hautes Études Commerciales of the University of Montreal, and will work in cooperation with that body. In addition to stimulating public interest in geography by lectures and excursions, it aims particularly at encouraging geographical research, the teaching of geography from the primary school to the university on modern lines, and the study of the regional geography of Quebec and the national geography of Canada. The geographical nomenclature of the Province of Quebec will also form another sphere of work. The Society proposes to establish a specialized library, and, when funds permit, to publish a Bulletin. Considerable support has already been received, and several meetings have been held.

THE U.S. DEPARTMENT OF AGRICULTURE

In recent years the Yearbook of Agriculture published by the United States Department of Agriculture has been issued in an improved form; the statistical section now appears separately, and each issue of the Yearbook deals with a theme of interest to farmers and to the public. The volume for 1938, entitled 'Soils and men' is in five parts: the nation and the soil, the farmer and the soil, soil and plant relationships, fundamentals of soil science, and the soils of the United States. The general point of view is the contribution of planned land utilization to an improved standard of living for the nation as a whole. Agriculture can obviously have a share only in this. Though, for example, it would be advisable to move four million people from the southern Appalachian region, the old Cotton Belt, and other areas of low standards if the agricultural system of the whole country is to be planned and a reasonable livelihood secured for those remaining on the land, the displaced cannot hope to find agricultural employment elsewhere and would have to look to industry for support, save for some pos-

sibility of part-time farming. Eighteen per cent. of the land under crops is unfitted for this use, and 52 per cent. of the remainder requires protection from soil erosion. Conditions leading to the present unsatisfactory position are examined; the land policy has encouraged wasteful exploitation of resources, and the laws of inheritance have led to excessive subdivision; but above all is the difficulty of assuring to the farmers a sufficient measure of economic stability, which requires a delicate balance between city and countryside. Other chapters describe methods of tillage, the use of fertilizers, and plants as soil indicators. A map of the soil associations of the United States on the scale of approximately 1/7·5M is provided.

The volume for 1939, 'Food and life,' of less direct interest to geographers, presents the latest research upon human and animal nutrition in an accessible form. It may be added that *Foreign Agriculture*, the monthly publication of the Department, which contains useful summaries of agricultural progress throughout the world, is now available in the Society's Library.

MEETINGS: SESSION 1939–40

Twentieth Meeting, 20 May 1940. Col. Sir Gerald P. Lenox-Conyngham in the Chair

Paper: Oceanic shelves. By Professor O. T. Jones

Twenty-first Meeting, 27 May 1940. Mr. Leonard Brooks, Vice-President, in the Chair

Elections: John Stanley Cumpston, B.A., LL.B.; Robert Benjamin Grove; Glenn Hoffman; Kailasapillai Kanapathipillai; Colonel P. R. Simner, C.B., D.S.O., D.L.; Reverend Alfred William Cyril Thrush

Paper: Graham Land and the problem of Stefansson Strait. By Mr. A. Stephenson

Twenty-second Meeting, 10 June 1940. Lord Moyne, Vice-President, in the Chair

Election: John Kevin Scally, B.A.

Paper: Forest versus desert in eastern Africa. By Mr. E. J. Wayland